SELF-REPORT OF SYMPTOMS IN ADOLESCENTS WITH ADHD

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Abstract

There is much debate regarding who are the best or appropriate informants regarding an individual's mental health symptoms and functioning (Achenbach, 2011; De Los Reyes, 2011). In childhood disorders such as ADHD, parents and teachers have typically been relied upon as the primary informants with respect to reporting ADHD symptoms (Smith, Barkley, & Shapiro, 2007); however, ADHD is now conceptualized as a lifespan disorder (Barkley, 2006; Vaughan, Wetzel, & Kratochvil, 2008; Whalen, Jamner, Henker, Delfino, & Lozano, 2002). This raises questions regarding who are the best informants in assessing ADHD during the transitional period of adolescence. The current study identifies a gap in the literature and practice guidelines and supports a developmental perspective in the diagnosis and care for adolescents with ADHD. Participants were 122 adolescents (27% female) diagnosed with ADHD with a mean age of 15.41years. Adolescents, their parents, and their teachers completed clinical interviews and questionnaires assessing symptoms, impairment, and behaviour. Parents reported significantly more symptoms than adolescents; however, teachers were similar to adolescents in their reports of ADHD symptoms and impairment. Despite reporting fewer symptoms than parents, adolescents reported ADHD symptoms at levels warranting clinical concern. Adolescents diagnosed with ADHD were also internally consistent and valid in their ADHD reports, at levels similar to parents and teachers. Those who reported high versus low levels of ADHD symptoms did not differ by age or gender; however, adolescents who reported high levels of symptoms also reported more impairment. Preliminary findings in line with the upcoming DSM-5 change in symptom

threshold for older adolescents are also explored. Overall, findings indicate that, in general, adolescents with ADHD possess the ability to recognize and report on their symptoms and impairment. Limitations and implications for clinical practice are discussed.

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Self-report of symptoms in adolescents with ADHD

Introduction

There is currently little research on self-report of ADHD symptoms and comorbid problems in adolescents with attention-deficit hyperactivity disorder (ADHD; APA, 2000; Gajaria, Yeung, Goodale, & Charach, 2011; Varley, 2011). In childhood disorders such as ADHD, parents and teachers have typically been relied upon as the primary informants with respect to reporting ADHD symptoms (Smith, Barkley, & Shapiro, 2007). As ADHD is now conceptualized as a lifespan disorder (Barkley, 2006; Turguay et al., 2012; Vaughan, Wetzel, & Kratochvil, 2008; Whalen, Jamner, Henker, Delfino, & Lozano, 2002), this raises questions regarding who are the best informants to assess ADHD in adolescents. However, the use and validity of self-report in adolescents with ADHD is in need of empirical examination. It has been argued by some that self-reporting by adolescents with ADHD is an important part of the diagnostic process (Bell, Kellison, Garvan, Bussing, 2010; Nahlik, 2004). However, the use and value of adolescent self-report is not currently emphasized in practice guidelines for ADHD in Canada, the United States, Australia, and Europe (e.g., CADDRA, 2011; Pliszka, 2007; NHMRC, 2009; Taylor et al., 2004). The current study addressed this gap in the literature by empirically examining the self-reports of ADHD and comorbid problems in adolescents diagnosed with ADHD.

The following section begins by discussing ADHD in the context of development with a particular emphasis on the changes and characteristics relevant to the period of adolescence in typical development and in ADHD. The literature on self-report in

ADHD is reviewed, followed by a discussion of current practice guidelines for ADHD. The literature comparing parent, teacher, and self-report in ADHD is reviewed, as well as the issue of informant discrepancies. The current study provides an empirical examination of self-reported symptoms in adolescents with ADHD.

Adolescence and ADHD

ADHD is a neurodevelopmental disorder characterized by symptoms of hyperactivity and impulsivity, inattention, or both, which causes impairment across multiple settings (APA, 2000). ADHD in adolescence has been less well-researched than childhood ADHD (Bussing, Zima, Mason, Porter, & Garvan, 2011; Sibley, Pelham, Molina, Gnagy, Waschbusch et al., 2012); however, some findings specific to this developmental period are available. The tasks and events characterizing the developmental changes in adolescence have highlighted this time period as a particularly critical transition period for children with ADHD (Whalen, Jamner, Henker, Delfino, & Lozano, 2002; Williamson, Koro-Ljungberg, & Bussing, 2009). Increases in social and cognitive demands in the context of decreasing support from parents and an adolescents' rejection of support combined with questioning of diagnosis can occur (Turguay et al., 2012). Developmental changes in symptoms, such as decreases in hyperactivity or impulsivity have been reported to occur, while symptoms of inattention become more prominent (Robin, 1998, Barkley, 2006). Adolescents with ADHD continue to experience the impairments of childhood ADHD, such as academic problems and issues in peer relationships, and also begin to display the impairments characteristic of adults with the disorder, such as driving problems (Neyens & Boyle, 2007), substance use

(Burke, Loeber, White, Stouthamer-Loeber, & Pardini, 2007) and risky sexual behaviour (Wolraich et al., 2005). ADHD in adolescence is a critical juncture for developing a coherent lifespan perspective on this condition. Furthermore, given ADHD is more accurately conceptualized as a lifespan disorder (Barkley, 2006; Turguay et al., 2012; Vaughan, Wetzel, & Kratochvil, 2008; Whalen, Jamner, Henker, Delfino, & Lozano, 2002), a "Life Transition Model" (Turguay et al., 2012) has recently been proposed. This model suggests that there are critical periods in development where there is a reduction in external resources for managing ADHD, increases in cognitive and behavioural stressors occurs, and individuals may be particularly engaged in reevaluating their perceptions, acceptance, and adherence to treatment for ADHD. In line with this model, adolescence represents a particularly critical developmental shift as it is bordered by two developmental transitions, childhood to adolescence, and adolescence to young adulthood, where individuals are particularly vulnerable to the factors above. A developmental perspective is needed to situate the challenges and milestones of adolescence into such a lifespan perspective on ADHD.

Adolescence likely presents unique issues and concerns with respect to ADHD behaviours (Hogue, Dauber, Lichvar, & Spiewak, 2012). While a developmental approach to ADHD has been recognized (Hogue, Dauber, Lichvar, & Spiewak, 2012; Nigg, 2006; Sonuga-Barke & Halperin, 2010), adolescent specific research and diagnostic guidelines are still needed (Anastopoulos & Shelton, 2001; Sibley, Pelham, Molina, Gnagy, Waschbusch et al., 2012). Currently, the majority of ADHD definitions, measures, and literature are child-based (Nahlik, 2004). Furthermore, as ADHD has been

considered as a lifespan disorder rather than just a childhood syndrome (Barkley, 2006; Vaughan, Wetzel, & Kratochvil, 2008; Whalen, Jamner, Henker, Delfino, & Lozano, 2002), there is a need for more research beyond childhood. It is essential to extend and develop our understanding of ADHD into adolescence and adulthood (Nahlik, 2004) in order to determine best practices while taking developmental context into consideration.

Typical Development in Adolescence

A developmental approach offers important implications for understanding psychopathology (Sroufe, 2009). With the onset of adolescence and the major changes inherent in this period, conceptualizing ADHD in the context of adolescent development is paramount. Development in adolescence brings advances in several domains, including cognitive development in the area of abstract thinking, thinking about possibilities, thinking along multiple dimensions, as well as developing capabilities in abstract, multidimensional, planned, and hypothetical thinking (Kuhn, 2009; Steinberg, 2005). Neural changes in brain structure have been linked to improvements in areas of executive functioning, such as planning ahead, and the ability to simultaneously consider multiple sources of information (Steinberg, 2010). Thus, changes in cognitive and neural structures equip adolescents to engage in more complex thinking and consideration than children, making this period of development uniquely important and separate from childhood.

Alongside these cognitive changes are accompanying changes in social and emotional development. These changes also importantly differentiate adolescence from childhood, including the development of identity and self-concept. Improvements in self-

evaluation (Steinberg, 2005) have been reported in adolescence, relative to childhood. Identity development (Erikson, 1968) involves the experimentation and exploration of different roles and personalities, and development of self-concept is another key aspect that emerges during this period. In particular, during adolescence individuals begin to make contextual differentiations in how they see themselves (Steinberg & Morris, 2001). For instance, teens view themselves differently with peers than with parents or teachers (Harter, Waters, & Whitesell, 1998) and also develop a more coherent sense of their personal identity. Adolescence also consists of increases in time spent alone and with peers and decreases in time with parents (Larson & Richards, 1991; Steinberg & Morris, 2001). It has been reported that approximately half of an average adolescent's time is spent with peers, while only 15% is with adults, including parents (Steinberg, Vandell, & Bornstein, 2011). As such, social acceptance by peers becomes paramount and adolescents experience a heightened awareness of social stimuli (Steinberg, 2008). The development of autonomy and independence are regarded as important features of adolescence as well (Steinberg & Morris, 2001). For example, changes in patterns of self-disclosure (Monck, 1991), a shift from sharing personal problems with parents to sharing with peers (Seiffge-Krenke & Kollmar, 1998; Steinberg & Morris, 2001), the development of adolescents' introspective capabilities (Danckaerts, Heptinstall, Chadwick, & Taylor, 1999), and increasing independence and decreasing parental involvement (Larson & Richards, 1991) represent important shifts.

Thus, there are two crucial developmental progressions in adolescents of particular relevance. From a cognitive developmental perspective, adolescents have

increased cognitive capacities to reason and make sense of the world. From a social and emotional perspective, adolescents are forming their own identity at least partly independently from parents and teachers, often in the presence of peers. With the increasing autonomy of adolescence, parents have decreased opportunities in which to observe adolescents' behaviour compared to when their teen was younger, as adolescents spend more and more days and nights away from adult supervision (Adler & Newcorn, 2011; Whalen et al., 2002). A developmental perspective would support the consideration of self-report as being informative for understanding adolescent behaviour.

Development in adolescents with ADHD. A developmental perspective has been recently emerging in the area of ADHD, particularly in the area of cognitive development (Halperin, Trampush, Miller, Marks, & Newcorn, 2008; Sonuga-Barke & Halperin, 2010). Some of the processes and brain regions that were previously described as developing in adolescence have been implicated as problematic in the individuals with a diagnosis of ADHD (Barkley, 2006). These include processes related to executive functions, such as inhibitory control and working memory (Brocki, Nyberg, Thorell, & Bohlin, 2007; Nigg, 2006). Studies have also demonstrated delays in cortical maturation, in particular in the prefrontal regions (Makris et al., 2007; Shaw et al., 2007; Shaw et al., 2011) and neuroimaging studies have revealed decreased volume of prefrontal regions (Nigg, 2006). These areas are linked to executive functions such as planning, attention control, response inhibition, and verbal reasoning. Thus, there are delays in cognitive and neural development in adolescents with ADHD. However, it has been reported that with increasing development, ADHD symptoms do seem to remit in some individuals

and that remitters are characterized by better performance on effortful executive processes compared to persisters (Halperin et al., 2008). The Halperin et al. longitudinal study importantly demonstrates a developmental trajectory of amelioration in executive processes in at least some individuals with ADHD, suggesting emerging cognitive competence in these youth.

There are studies to suggest that neural, cognitive, social, and emotional development is somewhat delayed in children and adolescents with ADHD (Barkley, 2006; Nigg, 2006; Wheeler Maedgen & Carlson, 2000). However, there is also evidence of similar social patterns in adolescents with ADHD to typically developing peers. Whalen et al. (2002) found that adolescents with high levels of ADHD symptoms were more likely to spend more time with friends and a boyfriend or girlfriend and less time with family than those with low ADHD symptoms, suggesting even more time outside of parental observation than typically developing youth. Similar to typically developing peers, adolescents with ADHD are also characterized by spending more time with peers than with family, suggesting that potentially diagnostic information about behaviour and functioning may be less available to parents. These developmental considerations are clearly relevant to ADHD and underscore the importance of considering and examining self-report of ADHD symptoms by referred adolescents. The presence of ADHD raises the issue of whether the associated cognitive deficits and social and emotional characteristics undermine the possible utility of self-report in adolescents with ADHD. It is an empirical question whether self-report in adolescents with ADHD has utility and validity in the assessment of behaviour. Some research has been conducted on the self-

report of ADHD symptoms in children and adolescents, and this will be considered next.

Self-Report in the Area of ADHD

The research literature on ADHD symptom reporting in adolescence is somewhat mixed, and certainly far from conclusive. Several studies (e.g., Danckaerts, Heptinstall, Chadwick, & Taylor, 1999; Hogue, Dauber, Lichvar, & Spiewak, 2012; Schaughency, McGee, Nada Raja, Sheehan, & Silva, 1994; Smith, Pelham, Gnany, Molina, & Evans, 2000) indicate low levels of parent-adolescent agreement on ADHD symptom reports. The limited value placed upon self-report is based on the idea that children are unaware of symptoms and that adolescents with ADHD tend to minimize their symptoms (Pelham et al., 2005; Smith et al., 2000). However, some recent studies seem to contradict previous findings suggesting that children do recognize their own ADHD symptoms (Bell, Kellison, Garvan, Bussing, 2010; Klimkeit et al., 2006). There is also an emerging research literature advocating for the consideration of the perspective of the adolescent with ADHD in the process of assessment and treatment (Brinkman et al., 2012; Bussing, Zima, Mason, Porter, & Garvan, 2011; Varley, 2011).

In an article discussing evidence-based assessment of ADHD in children and adolescents, it was stated, "there is currently no evidence supporting the validity of child self-report of ADHD symptoms, and "diagnosing ADHD is most efficiently accomplished with parent and teacher rating scales" (Pelham, Fabiano, & Massetti, 2005, p. 469). One key study is cited to support this claim, which concluded that adolescents are poor reporters of ADHD symptoms (e.g., Smith et al., 2000). In this study, adolescents diagnosed with ADHD attending a summer treatment program completed

questionnaire reports of inattention/overactivity and oppositional/defiant behaviours. Counselors and teachers in the program also completed these scales. Self-report was found to be reliable and consistent as examined by test-retest and internal consistency estimates on self-reports of the inattention/overactivity and oppositional/defiant scales of the IOWA Conners Rating Scale. However, self-report measures were weakly correlated with observed frequencies of negative behaviour reported by counselors and classroom observers. Adolescents reported lower levels of ADHD and ODD symptoms relative to adults. As such, the authors concluded that findings suggested these adolescents were either less aware of their symptoms or less likely to report them. Within the area of ADHD, other studies also indicate low levels of parent-adolescent agreement (e.g., Danckaerts, Heptinstall, Chadwick, & Taylor, 1999; Schaughency, et al., 1994; Smith, et al., 2000). Research studies that have demonstrated low child/adolescent-informant agreement on ADHD symptoms have been used as evidence against the use of self-report in diagnostic assessment.

In contrast, some recent studies seem to suggest even children recognize ADHD symptoms (Bell, et al., 2010; Klimkeit et al., 2006). Other studies have also argued for the collection of adolescent self-report, given findings that adolescents do report symptoms, despite self-reporting at a slightly lower level than parents (Hope et al., 1999). There is also extensive emerging research advocating for the consideration of the perspective of the adolescent with ADHD, as well as the potential negative implications of not involving the adolescent in the process of clinical practice (Brinkman et al., 2012; Bussing, et al., 2011; Varley, 2011). Child or youth input in the context of ADHD

assessment has only been considered, at best, as useful for providing input around comorbidities or impairment (Bell, et al., 2010; Nahlik, 2004), given the tendency of youth to rush through rating scales or respond carelessly (Sibley et al., 2010). There also appears to be a range of varying practices occurring in the assessment of ADHD in clinical research studies. Some studies include adolescents as informants in the diagnostic process (e.g., Carr, Henderson, & Nigg, 2010; Toplak et al., 2009), and some studies do not mention interviewing of participants and cite accordance with DSM criteria and completion of a standardized parent interview only (e.g., Lemiere, Wouters, Sterken, Lagae, Sonuga-Barke, & Danckaerts, 2010; Muller et al., 2011). The diverse treatment of adolescent self-report in the ADHD research literature and varying practices are likely due to the fact that there are no clear and explicit guidelines to understand the role of adolescent self-report in ADHD.

Examination of practice recommendations in ADHD. When examining key sources in understanding best practices in diagnosing ADHD, guidelines generally remain focused on parents and teachers as primary informants, but there are limited guidelines on how practice should be tailored to adolescents (CADDRA Canadian ADHD Practice Guidelines, 2011; Practice parameters for the assessment and treatment of children and adolescents with attention-deficit/hyperactivity disorder, Pliszka, 2007; European clinical guidelines for hyperkinetic disorder, Taylor et al., 2004). The DSM-IV TR (APA, 2000) also does not mention the use of self-report in the assessment of ADHD with older patients and simply notes that; "The clinician should therefore gather information from multiple sources (e.g., parents, teachers; p.87)." Furthermore, the

DSM-IV TR (APA, 2000) does not include specific developmental-level differences in the assessment of ADHD (Subcommittee on Attention-Deficit/Hyperactivity Disorder, Steering Committee on Quality Improvement and Management, 2011); however, it appears that the DSM-5 is attempting to enhance developmental sensitivity in order to improve the assessment of ADHD in older adolescents and adults (Tannock, 2012).

In the Practice Parameters for the Assessment and Treatment of Children and Adolescents With Attention-Deficit/Hyperactivity Disorder published by the Journal of the American Academy of Child and Adolescent Psychiatry (JAACAP; Pliszka, 2007), one recommendation is that assessment should consist of clinical interviews with both parent and patient. It is suggested preschool or younger school aged children could be interviewed concurrently with parents; however, older children and adolescents should be consulted separately. It is noted, however, that the focus of the child/adolescent interview is to determine other comorbid disorders rather than assess evidence for the diagnosis of ADHD, citing lack of awareness or minimization of symptoms of ADHD among children and adolescents with ADHD. Practice parameters also advise the use of common questionnaires (for instance, the Conners Wells Adolescent Self-Report scale); however, only emphasize parents and ideally teachers as those who should be asked to complete questionnaires, rather than adolescents themselves. European clinical guidelines for hyperkinetic disorder (European description of ADHD) also suggest an interview with a child aged 6 or older (Taylor et al., 2004). However, in line with the American Practice Parameters for ADHD (Practice parameters for the assessment and treatment of children and adolescents with attention-deficit/hyperactivity disorder,

Pliszka, 2007), assessment of other comorbid conditions or adjustment as opposed to assessment of ADHD symptoms and diagnosis is indicated as the purpose of the interview (Taylor et al., 2004). In general, there is less emphasis how care should be tailored specifically to adolescents with ADHD in practice guidelines (Bussing et al., 2011).

The Canadian ADHD Resource Alliance (CADDRA) Canadian ADHD Practice Guidelines (CAP-Guidelines) Third Edition (2011), offer separate guidelines for assessing both children and adolescents for ADHD. Both parameters suggest obtaining the teacher perspective and a symptom record completed by parents. The adolescent parameters add that the symptom record is "to be completed by both parents," but merely notes in parentheses that "you (i.e., the adolescent) can also try to complete it by yourself if you wish," hence conveying a very limited emphasis on the importance of adolescent self-report of symptoms. However, completion of a self-report measure of impairment by the adolescent is recommended.

Similarly, other sources also recommend interviewing children and youth separately; however, suggest limitations to the usefulness and weight placed upon this report. Barkley (2006), suggests, "time should always be spent interacting directly with the referred child[1]" (p. 351). Barkley goes on to discuss the importance of obtaining information regarding a patient's "views of reasons for referral and evaluations, views of family's functioning, perceptions of any additional problems, school performance, degree

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[1] One confounding issue within this area is the age range of samples. Often studies have been collected using samples aged 6-16, spanning childhood and adolescence. Additionally authors use the term "child" to refer to this large age range, and do not differentiate between childhood and adolescence. In this case, Barkley is referring to patients across the age range and loosely uses the term "child" to refer to children, adolescents, or grouped samples of children and adolescents in a number of instances.

of acceptance by peers and classmates, and any changes in the family the child believes might make life happier at home" (p. 351). Barkley does go on to specify... "Additional questions might reflect the phenomenology of ADHD from the perspective of the child, i.e., do you have trouble finishing your homework?" (p. 351), thereby indicating the importance of obtaining the young patient's perspective with respect to both impairment and ADHD symptom experience. That said, Barkley does not discuss how the patient interview is integrated into the diagnostic algorithm.

The recently updated Clinical Practice Guidelines for the Diagnosis, Evaluation, and Treatment of Attention-Deficit/Hyperactivity Disorder in Children and Adolescents from the American Academy of Pediatrics (Subcommittee on Attention-Deficit/Hyperactivity Disorder, Steering Committee on Quality Improvement and Management, 2011) includes an expanded age range of 4-18 years from the previous version targeted to children aged 6-12 years. These guidelines suggest separate treatment guidelines for each age group (preschool, children, adolescents). Assessment guidelines are not distinct for age group; however, do include "special considerations" sections for preschool aged children and adolescents. The Supplemental Appendix suggests interviewing the child/adolescent for the purpose of obtaining self-reported concerns regarding his/her behaviour, family relationships, peers, and school, the youth's view of what they would like to see changed, and views of functioning. It is recommended to collect a self-report questionnaire for adolescents; however, the focus of this was to examine reports of co-existing conditions such anxiety, mood disorders, and suicidal thoughts as much as it was to examine ADHD symptoms and subsequent risk for ADHD.

Guidelines cautioned the clinician to be aware of the tendency for children/adolescents with ADHD to underreport their symptoms and suggested examining self-reported symptom endorsement as a basis for "shaping the patient's understanding of ADHD, p. S17," only. Recommendations regarding use of self-reported symptoms in the diagnosis of ADHD were not discussed. However, the authors did discuss the importance of involvement of the patient as a factor in empowerment, understanding the diagnosis, and in later "buy-in" in treatment planning.

Sibley, Pelham, Molina, Gnagy, Waxmonsky, et al. (2012) made the following recommendations based on their study of young adults with ADHD: that the inclusion of informant reports is necessary, a less stringent symptom threshold for self-report of symptoms should be used, and that evidence of clinically significant impairment is key in the accurate identification of ADHD in young adults. In their review of self-report scales and evaluation of diagnostic practice in ADHD, Adler and Newcorn (2011), also concluded that clinicians should use both informant and self-report in assessment of ADHD in adolescents. Thus, it appears that practice guidelines specific to adolescents with ADHD are limited and where they do exist, there is minimal focus on the specific perspective of adolescents with respect to symptoms of ADHD.

Psychometric support for self-report in published scales. Although the research literature suggests low to moderate parent-child agreement exists in symptom ratings based on questionnaire rating scales, there is widespread and common use of empirically validated child/adolescent clinical self-report measures, including ratings of ADHD symptoms. These measures include the Self Report Form of the Conners' 3rd

Edition (Conners, 2008) for children as young as age eight, the Self-Report of Personality (SRP) child and adolescent forms for ages 8-11 and 12-21 of the Behavior Assessment System for Children-2nd edition (BASC-2; Reynolds & Kamphaus, 2004), and the Youth Self-Report for ages 11-18 portion of the Achenbach System of Empirically Based Assessment (ASEBA; Achenbach, 2001). This is not an exhaustive list of the self-report scales, but provides a sample of commonly used self-reports on broadband measures. In an analysis of construct validity in the recently published Conners' 3rd Edition, the technical manual reported significant moderate correlations on both the inattention and hyperactivity/impulsivity scales ranging from .46 - .55 between parent and self-reports and between teacher and self-reports. Analyses were conducted using an extensive standardization sample of children and youth aged 8-18 from Canada and the United States. Measures of internal consistency indicated alpha values ranging from .75 - .89 from males aged 10-18 on the inattention and hyperactivity/impulsivity scales and values ranging from .80 - .88 for females. Validity was also considered to be acceptable. The manual for the ASEBA reported a significant correlation of .48 between the attention problems subscale of the Youth Self-Report and the parallel parent report, the Child Behavior Checklist (CBCL), for youth aged 11-18.

More recently, studies have emerged regarding the development of ADHD scales specifically for adolescents (Adler & Newcorn, 2011; Adler, Shaw, Spencer, Newcorn, Hammerness, Sitt, et al., 2012). The Attention-Deficit/Hyperactivity Disorder Self-Report Scale v1.1 (ASRS) demonstrated high internal consistency and high concurrent validity (Cronbach's alpha coefficients ranged from .92 - .96 and correlation coefficients

ranged from .68 to .92) using a sample of adolescents diagnosed with ADHD (Adler et al., 2012). Furthermore, there were no age or gender effects in the consistency and validity analyses, indicating the measure is useful for males and females across the developmental period of adolescence. Thus, child and adolescent self-report scales are widely available and demonstrate good psychometric properties for use with children and adolescents with ADHD.

Examining Report Across Informants: What the Empirical Studies Report

One method of examining the utility of self-report in adolescents with ADHD is to compare their report with that of other informants, including parents and teachers. It has been consistently reported in the research literature that there is low to moderate agreement in the area of attention symptoms in self and parent report in adolescence (Connors, Connolly, & Toplak, 2012, Hope et al., 1999; Klimkeit et al., 2006; Rescorla et al., 2007; Seiffge-Krenke & Kollmar, 1998; Rescorla et al. 2007; Smith, 2007). While it has been acknowledged that general informant discrepancies are one of the most consistent findings in clinical science (Achenbach, 2006; Achenbach, McConaughy, & Howell, 1987), adolescents with ADHD are broadly considered to be poor self-reporters (Danckaerts et al., 1999; Hogue et al., 2012; Nahlik, 2004; Schaughency et al., 1994; Smith et al., 2000). However, the majority of these studies have relied primarily upon questionnaire scales to examine and compare symptom reports across raters. One study by Hartung, McCarthy, Milich, and Martin (2005) examined parent and adolescent reports across formats (interview and questionnaire) in a sample of clinic referred and non-referred youth with a variety of psychiatric or behavioral diagnoses. Results of this

study indicated adolescents self-reported more symptoms of inattention and conduct disorder by interview than by questionnaire and more symptoms of hyperactivity/impulsivity by questionnaire than by interview. The authors concluded that it is optimal to use semi-structured interviews rather than rating scales in the assessment of disruptive behavior disorders.

A limited number of studies have examined parent and adolescent report of ADHD symptoms by diagnostic interview. One study by Hogue, Dauber, Lichvar, & Spiewak (2012) compared caregiver and adolescent interview symptoms in a sample of adolescents diagnosed with a variety of DSM-IV diagnoses. Findings demonstrated low correlations (r = .14 and r = .16, respectively) between adolescent and caregiver reports on the dimensional scales of Inattention/Disorganization (I/D) and Hyperactivity/Impulsivity (H/I). The mean number of symptoms on the I/D scale for adolescents was 4.3 (SD = 2.4) and for caregivers was 5.6 (SD = 2.6), while for the H/I scale adolescents reported a mean of 3.4 symptoms (SD = 2.3) and caregivers reported a mean of 3.1 (SD = 2.6) symptoms. Reports of H/I did not differ between caregiver and adolescent, while I/D reports did. However, both adolescents and caregivers reported significantly more symptoms of inattention than hyperactivity, indicating adolescent report is consistent with the developmental pattern of changes in ADHD symptoms across development. Furthermore, both caregiver and adolescent reports of I/D symptoms predicted perceived need for treatment, indicating adolescent endorsements of I/D symptoms, albeit at a lower level than caregivers, were sufficiently indicative of adolescents' recognition of treatment need. No gender differences were found for H/I

symptoms on either caregiver or adolescent report, but caregivers reported more I/D symptoms in boys than in girls.

Hope et al. (1999) compared parent and adolescent interview reports using the DICA-R with a variety of DSM-IV diagnoses. Parents reported more symptoms of ADHD (mean number of symptoms = 9.42) by interview than adolescents reported (mean number of symptoms = 8.34). Despite the statistically significant difference in parent versus adolescent reported symptoms, adolescents did report a large number of ADHD symptoms. As such, the authors emphasized the importance of collecting adolescent report during assessment. Additional studies have demonstrated adolescents with ADHD to be highly consistent reporters across different instruments (Hartung et al., 2005; Smith et al., 2000).

Some research has also begun to support the ability of even young children to self-report ADHD symptoms. A study conducted by Klimkeit et al. (2006), examined the common assumption that children cannot provide information about their behaviours and internal states. In this study, 6-14 year olds diagnosed with ADHD were administered the Self-Evaluation Scale for Children (SES-C), which is 22 item visual analog scale examining feelings and behaviours associated with ADHD and comorbid conditions. Children's scores on the SES-C were significantly correlated with parent and teacher reports of inattention and hyperactivity-impulsivity using the home and school versions of the Attention Deficit Disorder Evaluation Scale (ADDES; McCarney, 1995). These authors found that participants were able to provide useful information about their ADHD symptoms when assessment was conducted in a developmentally meaningful way.

Discrepancies in informant agreement also occur within the area of adult ADHD; however, it has been suggested that adults with ADHD are the best informants with respect to their ADHD symptoms (Kooij et al., 2008). The majority of studies examining agreement between adult self-reports and other informant reports (e.g., partners, parents) in clinical samples with ADHD also demonstrate low to moderate agreement using a variety of rating scales (Kooij et al., 2008; Manor et al., 2011; Sibley, Pelham, Molina, Gnagy, Waxmonsky et al., 2012; Young, 2004; Zucker, Morris, Ingram, Morris, & Bakeman, 2002). Another study examining a sample comprised of ADHD diagnosed individuals, clinical controls with attention problems, and community controls reported moderate to high agreement between self and informant reports of current symptoms (Barkley, Knouse, & Murphy, 2011). When self-reports were compared to informant reports in this study, current ratings of IN and HI symptoms and impairment were significantly higher than informant reports (Barkley et al., 2011). One study examining ADHD symptoms in adults across a number of rating scales and clinical interview in a sample diagnosed with ADHD found low agreement among reporters. However, patients provided more accurate information than did informants, suggesting that adults with ADHD are the best informants with respect to their symptoms, despite some underreporting (Kooij et al., 2008).

Based on studies examining symptom reports in individuals with ADHD, interview reports may provide different findings than rating scales. It seems that there remains discrepancies between adolescent and parent report such that adolescents tended to report lower levels of symptoms by interview than parents reported. However,

adolescents still tended to report symptoms by interview at a level that was clinically significant or warranted clinical attention, and in some cases adolescent interview report of ADHD symptoms has been adequate to predict important variables such as need for treatment. As such, both interviews and rating scales were used in the present study. There is some variability in findings comparing self and informant report in adults, nevertheless, adult self-reports and the patients' own perspectives are included in the diagnostic process (Barkley, 2006).

Consideration of teacher report. A limited number of studies have compared self-reports of adolescents to both parent and teacher report in the area of ADHD symptoms. For instance, work by Sibley, Pelham, Molina, Gnagy, Waschbusch et al. (2012) examining parent, teacher, and youth reports of ADHD symptoms in adolescents aged 11 to 17 using the Disruptive Behavior Disorders Scale (Pelham, et al. 1992) reported that adolescents rated impairment and symptoms lower than parent and teacher reports. This study differed from the current study in that it examined rating scales between informants, did not include interviews across informants, and included retrospective reports given it was a longitudinal study of individuals followed over a number of years. This study is also one of the few specifically examining correlations between parent and secondary school teacher reports, finding moderate correlations (.32-.41), while one other study examining a similar construct found no correspondence between parents and teachers (Fischer et al., 1993). In fact, work by (Smith et al., 2000) concluded that while adolescents did not provide unique information above and beyond what was provided by adults with respect to ADHD symptoms (using questionnaire), the

authors found adolescent self-report to be reliable and consistent (e.g., test retest reliability and internal consistency were high). These authors concluded that adolescents can provide reliable information, and noted "the high degree of retest and internal consistency reliability exhibited by the adolescents is remarkable considering the conventional wisdom that adolescents with ADHD are thought to impulsively or inattentively rush through sets of questionnaires or other tedious tasks. In this study, it was noted that ratings completed by the adolescents were as good as, and in some cases better than, the reliability of ratings completed by the counselors and the teacher" (p. 496).

Many studies have focused on the examination of parent versus teacher report in ADHD samples, yet the concordance between these informants is also modest. While there is some commonality between parent and teacher reports, perspectives do vary across a variety of areas and in general, modest agreement between parent and teacher report is also reported (Barkley, 2006; Cho et al., 2011; Smith, 2007). Rettew et al. (2011) examined parent and teacher reported symptoms in a large population-based sample and found that teachers identified lower percentages of children with problem behaviours (i.e., hyperactivity/impulsivity, rule-breaking behaviour, and aggressive behaviour) compared to parents. This finding was consistent with another study where parents reported more symptoms relative to teacher reports (Youngstrom et al., 2000). With respect to gender, Derks, Hudziak, & Boomsma (2007) found that teachers report less inattention in girls than boys in children with ADHD. Rettew et al's (2011) examination of problems that were home or school specific, reported that there were

proportionately more girls with home-specific problems only, suggesting teachers may not report inattention and hyperactivity in girls as commonly as in boys.

There is some evidence to suggest teacher reports may be more accurate given teachers' familiarity with age-appropriate behaviour, ability to make comparisons to a variety of same-aged peers, and knowledge and attunement to developmental change in children (Cho, Kim, Kim, Shin, Yoo, Kim et al., 2011), as compared to the more limited reference base that parents may have (e.g., comparisons with one or two siblings). Despite some of the complications in using teacher report with adolescents, such as adolescents' involvement with multiple teachers and teachers' work with a multitude of different students each day (Evans, Serpell, Schultz, & Pastor, 2007), studies have concluded teacher report is critical for diagnosing ADHD in adolescence (Sibley, Pelham, Molina, Gnagy, Waschbusch et al., 2012). In particular, teachers have been recognized as important in reporting on impairment, symptom presentation at school, and cognitive performance (Cho et al., 2011). In addition, symptoms of inattention may contribute to greater impairment in the classroom than in the home setting (Hogue et al., 2012).

In summary, it appears that adolescents tend to report fewer ADHD symptoms relative to other informants, but with consistency across symptoms. While there is low to moderate agreement between parent and self-reports, studies also demonstrate limited agreement between parents and teachers. The following section will discuss potential reasons for these discrepancies.

Understanding informant discrepancies. The ADHD literature has framed self-report as primarily a discrepancy issue – namely that adolescents underreport, implying that they are poor informants of ADHD symptoms. However, the self-report issue is complex and can be informed by a developmental perspective. From a cognitive developmental perspective, adolescents have increased capacity for recognizing and understanding ADHD related behaviours. Longitudinal work examining the developmental trajectory of adolescents with ADHD demonstrates amelioration in executive processes in at least some individuals with ADHD, suggesting emerging cognitive competence in these youth (Halperin et al., 2008). Studies examining internal consistency in self-reporting of ADHD symptoms in adolescents suggest competence in consistency in reporting of ADHD symptoms across instruments (Hartung et al., 2005; Smith et al., 2000). From a social/emotional perspective during the developmental period of adolescence, one would expect some discrepancy between adolescent and other reports, as adolescents are beginning to lead partially independent lives with peers, and parents and teachers would not have access to these experiences.

In his commentary discussing 20 some years of research on informant discrepancies, Achenbach (2011) summarizes two early papers that examined correlations between teacher and parent reports of childhood behaviour in the 1980's. The conclusion of one of these papers was that parents were poor informants because they did not agree with teachers, while the other paper concluded that teachers were poor informants because they did not agree with parents. This finding highlights the issue inherent in making assumptions regarding informant validity when compared to another

source/informant. Achenbach's commentary on navigating informant discrepancies concluded that discrepancies should neither be attributed to simple measurement error nor conclude that discrepancy reflects the accuracy of one informant relative to another. Different informants offer information that is unique and important. We need to move beyond simply examining informant discrepancies as the typical evidence that has been used to evaluate the utility of self-report of ADHD symptoms in adolescents.

It is noteworthy that this literature is in contrast to reliance on child and adolescent report with respect to internalizing disorders such as anxiety and depression (Loeber, Green, & Lahey, 1990). Children as young as age four have been relied up to report symptoms of internalizing problems such as anxiety and depression and self-reports in this area are a key factor in diagnostic practice (Luby, Belden, Sullivan, & Spitznagel, 2007; Smith et al., 2007). The fact that self-reports in childhood and adolescence are relied upon for internalizing disorders, yet are not addressed in disorders such as ADHD suggests a gap in the research literature with respect to our understanding of self-report across developmental conditions. As previously described, a developmental perspective from adolescence provides support for these discrepancies, suggesting that some discrepancy is developmentally appropriate and expected.

In general, taking a developmental perspective would suggest the utility of self-report in adolescents with ADHD. The current literature on adolescent self-report of ADHD is sparse and has focused on informant differences, but this method offers a limited way to consider the validity and utility of adolescent self report of ADHD. On the whole, disagreement between informants should be viewed not as the result of

unreliable informants, but instead as a useful opportunity to understand behaviour across different perspectives and settings (Rettew et al., 2011). As such, current practice parameters do not explicitly guide the use of self-report in adolescents with ADHD, and this needs to be remediated.

Current Study

The status of self-report of ADHD symptoms and comorbid conditions in the field of ADHD has been characterized by mixed findings in informant comparisons and little explicit mention of the use of self-report of symptoms in practice parameters for diagnosing ADHD, yet the availability of several standardized measures for assessing self-reported symptoms in adolescents with ADHD is widespread. Together, it is unclear whether researchers and clinicians should rely on and use self-report by adolescents with ADHD. The current study included a sample of adolescents diagnosed with ADHD in order to examine the issue of self-report using several methods, including (1) examining the mean level of symptoms of ADHD reported by interview; (2) examining questionnaire reports and discrepancies between parent, teacher, and self-reports of ADHD symptoms and comorbid ratings of difficulties and impairment; (3) internal consistency of ratings by self, parent, and teacher reports of ADHD symptoms; (4) concurrent validity among instruments between self, parent, and teacher reports of ADHD symptoms; and (5) examination of individual differences in self report of ADHD symptoms of adolescents diagnosed with ADHD. All of these questions were examined using interviews and behaviour ratings. In addition, gender differences were examined in all of the analyses, as self-report of internalizing and externalizing symptoms have been

shown to vary by gender (Galambos, Berenbaum, & McHale, 2009; Gershon, 2002; Rescorla et al., 2007; Rucklidge & Tannock, 2001). The current study offered a novel and comprehensive approach to examining adolescent self-report of ADHD symptoms across both interview and questionnaire measures, as well as by comparing adolescent report to interview and questionnaire measures collected from both parents and teachers.

Research Hypotheses

1. **Examining interview reports of ADHD symptoms.** Based on the existing ADHD literature, it was expected adolescents would endorse fewer ADHD symptoms than parents and teachers, but that adolescents would report symptoms at a level warranting clinical concern. Gender was also investigated as a variable of interest in adolescent symptom reporting.

2. **Examining questionnaire reports and discrepancies between parent, teacher, and self-reports of ADHD symptoms and comorbid ratings of difficulties and impairment.**

Consistent with previous work, informant comparisons (parent, teacher, adolescent) of questionnaire reported ADHD symptoms and social emotional reports were also conducted. Adolescent self-reports of other socio-emotional symptoms measured by questionnaire were compared to parent and teacher reports. It was expected that adolescents would report fewer ADHD symptoms by questionnaire than parents and teachers. However, with respect to impairment, it was hypothesized that adolescents would report impairment at levels similar to parents and teachers based on the literature.

Gender was also investigated as a variable of interest in ADHD symptom and impairment reporting.

3. Internal consistency (consistency within instruments). Internal consistency of the self-reports of adolescents with ADHD was examined. It was hypothesized that adolescents would demonstrate high internal consistency in their reports at levels similar to parent and teacher informants.

4. Concurrent validity (consistency between instruments measuring a similar construct). Concurrent validity of the self-reports of adolescents with ADHD was examined. It was hypothesized that adolescent symptoms of ADHD reported in the K-SADS-PL interview would be highly correlated with ADHD symptom reports on the SDQ questionnaire, and comparable to associations obtained with parent and teacher reports on interview and questionnaire.

5. Understanding individual differences in self-report. A number of exploratory analyses were conducted to understand adolescents demonstrating a range of self-reporting.

i. High and low self-reporters of symptoms were compared. From a developmental perspective, it was expected that adolescents who reported more symptoms would be older. It was also predicted that adolescents who were high reporters of ADHD symptoms would also report more impairment. Other correlates of symptom reporting (gender and comorbidity) were also explored.

ii. Given the recent DSM-5 finalization of different diagnostic parameters for adolescents aged 17 and up versus those 16 and under, this age distinction was

also examined in the current sample, where feasible, in order to generate some preliminary findings.

Method

Participants

There were 122 adolescents diagnosed with ADHD included in the present study from a pediatric hospital in a large metropolitan city. Participants were part of a larger study investigating inattention and working memory in adolescents. Of the 215 adolescents who came to the clinic, 10 were excluded based on criteria discussed below, 41 were considered to have subclinical ADHD, and 42 were considered psychiatric controls, and the remaining 122 met criteria for the current study. The mean age of the current sample was 15.41 (SD = 1.58), range = 13-18 years, with a mean FSIQ of 103.86 (SD = 11.03). Males comprised 73% (n = 89) of the sample. There were 22 participants in the sample who were 17 or 18 years old, 14 of these individuals were male. Approximately one-third (31%) of the sample were on medication for attention difficulties. Participants were recruited through advertisements at local pediatric offices and were all native English speakers. The majority of parent informants were well-educated, with 47% having completed university education and an additional 32% having finished or completed at least some community college or technical college, suggesting an upper level socio-economic status of the sample. Adolescents were excluded from the study if there was any evidence of a serious medical and/or neurological condition, psychosis, bipolar disorder, or pervasive developmental disorder, using a semi-structured clinical interview with parents, the Schedule for Affective Disorders and Schizophrenia for School-Age Children – Present and Lifetime Version (K-SADS-PL; Kaufman et al., 1997), or had an overall IQ below 80 based on the full scale IQ on the Wechsler

Intelligence Scale for Children - Fourth Edition (WISC-IV; Wechsler, 2003) or the Wechsler Adult Intelligence Scale, Third Edition (WAIS-III; Wechsler, 1997).

Diagnostic characteristics. The ADHD diagnosis in this study is consistent with other studies that have reported on this dataset (Rogers, Hwang, Toplak, Weiss, & Tannock, 2011; Toplak et al., 2009). Diagnosis was based on a clinical interview, information from teacher reports for evidence of pervasiveness, and case review with consulting psychiatrist to rule-out other conditions. Specifically, ADHD was diagnosed if the following conditions were satisfied: 1) the participant met the DSM-IV criteria for ADHD according to the clinician's summary of the K-SADS-PL; 2) presented with the externalizing symptoms of ADHD according to teacher ratings on the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997) or the SWAN[2] Questionnaire (the Strengths and Weaknesses of ADHD-Symptoms and Normal Behaviour Scale (SWAN), assesses inattention and hyperactive and impulsive behaviours on a continuum, from positive attention skills to attention problems; Swanson et al., 2005) to verify the existence of symptoms across settings; and 3) evidence of impairment on the SDQ.

The primary diagnostic instrument to diagnose ADHD was the K-SADS-PL, which is described in detail below as it was one of the instruments used in this study. Note that while adolescent report was gathered and used as a measure in this study, it was not used to influence the diagnosis of ADHD. Teacher reports on the SDQ were used to establish the criteria of pervasiveness. The age of onset criteria was not used in the

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[2] The SDQ was relied upon primarily for teacher ratings. Only one participant did not have SDQ teacher data available thus the SWAN teacher questionnaire was used for evidence of pervasiveness.

diagnosis of ADHD as recent work supports a lack of validity in using the age 7 onset cut-off criteria (Kieling et al., 2010).

Of the 122 participants in the study, 75 met criteria for the DSM-IV ADHD-Inattentive subtype, 45 the Combined subtype, and two for the ADHD-Hyperactive/Impulsive subtype. Subtype determination was based on parent reports and current presentation. Many of those who met criteria for ADHD had comorbid diagnoses, including a Mood Disorder (9.9%), Anxiety Disorder (23.8%), Oppositional Defiant Disorder (16.4%), Conduct Disorder (4.9%), Learning Disorder (34.4%), or another DSM-IV diagnosis (5.8%). Learning Disorder diagnoses were based on current criteria from the Learning Disabilities Association of Ontario (LDAO; Kozey & Siegel, 2008), such that individuals were required to demonstrate impairments in one or more processes related to learning, combined with unexpectedly low academic achievement, in the context of otherwise average abilities in other areas essential for thinking and reasoning.

Measures

Clinical interviews. A semi-structured diagnostic interview was conducted with adolescents and parents using the Schedule for Affective Disorders and Schizophrenia for School-Age Children – Present and Lifetime Version (K-SADS-PL; Kaufman et al., 1997). A clinical psychologist or a supervised PhD candidate in clinical psychology performed the interviews. Interviews were conducted separately with parents and adolescents, but the same clinician interviewed both informants. The K-SADS-PL is a widely used diagnostic measure that allows for the comparison of responses from multiple informants. Items were scored using a 3-point rating scale (1 = symptom not

present, 2 = sub threshold symptom, and 3 = symptom present). For the K-SADS-PL, moderate test-retest reliability has been demonstrated with $r = 0.63$, comparable with other child psychiatric interviews, and inter rater reliability has been reported as 98% agreement (Kaufman et al., 1997). Parents and adolescents were interviewed separately by the same clinician for the K-SADS interview. The clinician summary scores were used to determine diagnoses. Parent report was given more weight for reporting of current externalizing (ADHD, ODD, and CD) disorders, autism/asperger's screening items, separation anxiety, enuresis and encopresis, and tic disorders. Adolescent report was generally given more weight for the internalizing disorders (mood and anxiety) and substance use. Both parent and adolescent reports were given equal weighting for symptoms of mania, psychosis, and obsessive-compulsive disorder. Few discrepancies emerged on such items, as the frequency of these symptoms was rare in this sample.

In the current study, the data examined were the individual parent and adolescent reports on each symptom, as opposed to the clinician's summary (diagnoses were based on clinician summary as described above). For the majority of analyses only symptoms reported as "present" (i.e., "3") were examined and were summed to create a total number of symptoms score. Composites of inattentive and hyperactive/impulsive symptom scores, along with (a total number of symptoms score) were also calculated. In a select number of analyses, sub threshold symptoms (i.e., "2") were also examined. Other clinical cut-offs (i.e., 5 symptoms as proposed by DSM-V as compared to 6 symptoms for older adolescents) were also explored.

Teachers were interviewed by telephone using a semi-structured diagnostic interview, the Teacher Telephone Interview (TTI; Tannock et al., 2002), is a semi-structured diagnostic which elicits teachers' descriptions of the student's behaviour and impairment in specified contexts at school (e.g., whole-class instruction, small-group work, individual seat work, transitions, interactions with peer and adults in the school setting), thereby covering all symptoms of ADHD, ODD and CD. Evidence for each symptom is provided to highlight examples of behaviors that the interviewer is seeking to endorse symptom presence. Examples of probes are also listed to assist the interviewer in querying for information that has not yet been provided by the teacher. The TTI was conducted with the teacher who spent the most time with the adolescent, typically the homeroom teacher. The TTI has demonstrated high interrater reliability for the diagnosis of ADHD ($\kappa = .85$) as well as individual ADHD symptoms ($\kappa = .65 - .95$; Valo & Tannock, 2010). The interview generates symptom scores for each of the 18 ADHD symptoms based on presence, persistence, and severity of the specified behavioral manifestation and the associated impairment. Symptom scores ranged from 0 - 3 (no evidence of the symptom or associated impairment, evidence of occasional mild problem and slight impairment, evidence of frequent problem with moderate impairment, and evidence of extreme problem and marked impairment). Symptoms reported as a "2" or a "3" (Tannock et al., 2002) were counted as present and summed to create a total number of symptoms score. Composites of inattention and hyperactive/impulsive symptom scores, along with a total number of symptoms score were calculated.

Behavioural ratings. The Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997) is a brief behavioural screening questionnaire for 3-17 year olds and includes 25 questions pertaining to five subscales assessing emotions and behaviours, and questions examining impairment associated with behaviours in the areas assessed. There are slightly different versions of this questionnaire for parents, teachers, and adolescent self-report. Items are similar across respective versions, but are worded to reflect the particular informant Parents, teachers, and adolescents in the clinical samples completed respective versions of the SDQ. With respect to teacher reports, parents were asked to select a teacher who was most familiar with the student's academic performance and behaviour in school. This was usually a teacher from a core subject area who knew the student well. The same teacher informant was used for all measures.

Emotion and behaviour questions. The SDQ is comprised of 25 questions asked in either a positive or negative frame about the areas of emotional symptoms, conduct problems, hyperactivity/inattention, peer relationship problems, and prosocial behaviour. There are five subscales derived from five questions following each of the areas listed above, as well as a total difficulties score generated by summing scores from all scales except the prosocial scale. Each item is scored on a 3-point scale with 0 = 'not true', 1 = 'somewhat true', and 2 = 'certainly true'. The hyperactivity/inattention subscale has a specificity of 92%, and a sensitivity of 74% for an ADHD diagnosis (Goodman, 2001). The SDQ has been used and validated across a variety of populations and cultures and has adequate reliability and validity (Cuffe, Moore, & McKeown, 2009; Goodman, 2001; Muris, Meesters, & van den Burg, 2003).

Impact supplement. There is also an "impact supplement" on the SDQ where questions regarding the level, frequency, and area of impairment caused by symptoms are reported. The impairment questions inquire further about chronicity, distress, social impairment, and burden to others. Each item is scored on a 4-point scale with 0 = 'not at all', 1 = 'only a little', and 2 = 'quite a lot', and 3 = 'a great deal'. An SDQ impairment total score was derived by summing impairment ratings across items individually for parent, self, and teacher reports using the six impairment questions that were consistent across informant versions of the scale, (possible scores ranged from 0-18).

For the purposes of the current study, in order to establish the criteria of pervasiveness, teachers had to rate impairment on the SDQ, as follows: The relevant teacher questions from the SDQ that ask for impairment are the following:

1. Overall, do you think that this child has difficulties in one or more of the following areas: emotions, concentration, behavior or being able to get along with people (No; Yes, minor difficulties; Yes, definite difficulties; Yes, severe difficulties)?

2. Do the difficulties interfere with the child's everyday life in the following areas (peer relationships, classroom learning; Not at all, only a little, quite a lot, a great deal)?

3. Do the difficulties put a burden on you or the class as a whole (Not at all, only a little, quite a lot, a great deal)?

The teacher must indicate "Yes" on first question and "Quite a lot" or "A Great Deal" on the second or third question in order to indicate significant impairment. If teachers did not report impairment on the SDQ clinicians reviewed the files to examine whether impairment was reported in school reports or in the teacher interview.

In the current study, the five subscales, the total difficulties score, and the impairment ratings were examined.

Procedures

A telephone screening interview conducted prior to the assessment confirmed that all participants had a history of ADHD symptoms or a previous diagnosis of ADHD, and parents and teachers completed behavioural ratings prior to the assessment. Teacher telephone interviews were typically conducted after the clinical assessment with parent and adolescent was completed. Participants currently taking medication were asked to stop at least 24 hours prior to their participation in the study. On the day of assessment, participants and their parents completed informed consent/assent. Parents and adolescents were interviewed separately and adolescents completed all other measures in a separate room with an examiner. All participants were provided with volunteer hours and $20 for reimbursement of expenses.

Results

Examining Interview Reports of ADHD symptoms

When considering all 18 ADHD symptoms, adolescents diagnosed with ADHD reported a mean of 7.03 (SD = 4.35) symptoms to be currently present on the K-SADS-PL, while parents endorsed a mean of 9.91 (SD = 2.84) symptoms on the K-SADS-PL, and teachers endorsed a mean of 7.92 (3.76) symptoms on the TTI.

The distributions of parent, self, and teacher-reported ADHD symptoms were also examined to explore the pattern of symptom endorsement in the sample. See Figure 1 for a distribution of the percentage of symptoms endorsed by each informant. A large percentage of adolescents did report lower numbers of symptoms, that is, 31% of the sample reported 4 or less symptoms as present all of the time (this division was chosen to generate groups of a similar number of adolescents at the low and high ends of the distribution). However, there were also a considerable number of adolescents endorsing a large number of symptoms, that is, 30% of the sample endorsed 10 or more symptoms as present all of the time). This indicates considerable variability in adolescent reporting of symptoms. Normality statistics for the distribution of symptoms for each informant were also examined. Values for skewness and kurtosis were all within acceptable limits for each of the three informants, indicating relatively normal distributions and variability in symptoms endorsed as present.

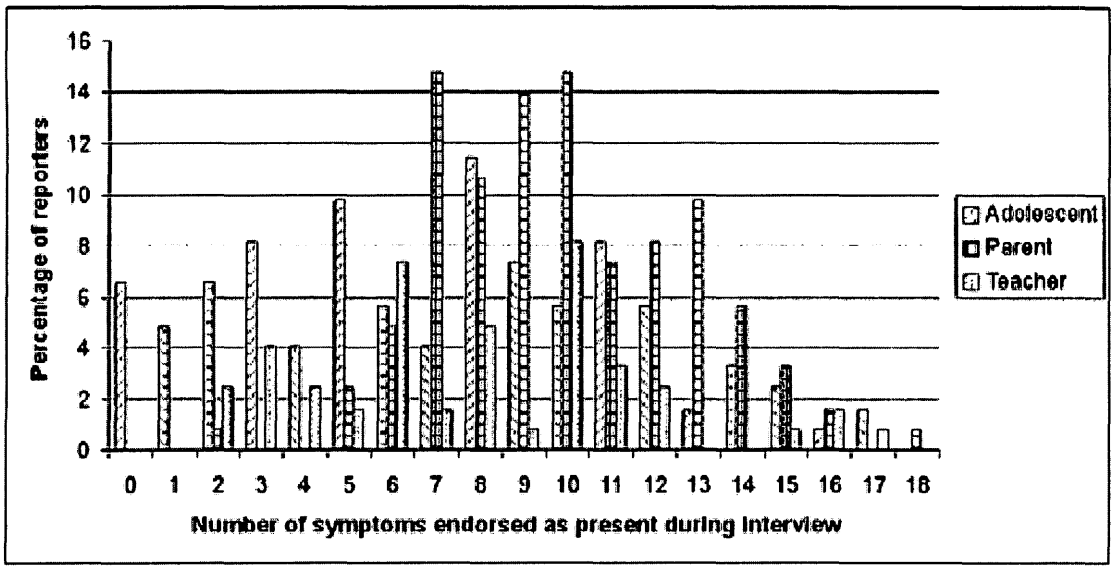

Figure 1. ADHD symptoms endorsed by informant (percentage).

Three separate 2 (gender) by 3 (informant) way repeated measures ANOVA's were used to compare the number of symptoms endorsed as present during interviews by adolescents, their parents, and their teachers. Teacher interviews were available for 51 participants out of the 122. A one-way ANOVA indicated that participants who had available teacher interviews did not differ from those who did not on gender, age, full scale IQ, academic skills, or teacher questionnaire reports of ADHD symptoms, impairment, or total difficulties. Notably, it was rare that teachers refused to complete the TTI. Generally a missing TTI occurred primarily when the adolescent was assessed during the summer or at the beginning of a new academic year, or during times of the year when teachers were busy with exam marking or final reports. Gender was entered as the between subjects factor and informant was the within subjects factor. When examining all 18 ADHD symptoms, there was a significant effect of informant, $F(2, 48) = 11.04$ $p < .001$. Pairwise comparisons revealed that parents reported significantly more

symptoms than both adolescents and teachers ($p < .001$), but adolescent and teacher reports did not differ ($p = .50$). Neither the main effect of gender nor the gender by informant interaction were significant. With respect to inattention symptoms alone, there was a significant effect of informant, $F(2, 48) = 20.34$ $p < .001$. Pairwise comparisons revealed that parents reported significantly more symptoms of inattention than both adolescents and teachers ($p < .001$), but adolescent and teacher reports did not differ ($p = .69$). Neither the main effect of gender nor the gender by informant interaction were significant. When examining hyperactivity/impulsivity symptoms only, there were no significant effects, such that adolescents, parents, and teachers did not differ on symptom reporting. See Table 1 for mean values.

Table 1

Mean number (SD) of ADHD symptoms reported as present on K-SADS-PL/TTI (n = 51)

	Adolescents		Parents		Teachers	
	Males (n = 40)	Females (n = 11)	Males (n = 40)	Females (n = 11)	Males (n = 40)	Females (n = 11)
Total ADHD symptoms (max = 18)	6.45(4.75)	6.27(4.65)	10.65(2.82)	9.36(3.23)	8.53(3.67)	5.55(3.36)
Inattention symptoms (max = 9)	3.75(2.84)	4.18(2.93)	6.95(1.48)	7.00(2.00)	4.90(2.17)	3.55(2.02)
Hyperactivity Impulsivity symptoms (max = 9)	2.62(2.53)	2.09(2.07)	3.67(2.47)	2.36(1.80)	3.72(2.49)	2.00(1.90)

Parent and self-reports were also examined taking into account both symptoms endorsed as present during interview and symptoms endorsed as "subthreshold," (i.e., "2" on the K-SADS-PL for both parents and adolescents) to determine whether parent-adolescent differences would disappear if intensity of symptom reporting was taken into account. Adolescents reported significantly more symptoms (M = 10.57, SD = 4.15) when taking subthreshold symptoms into account compared to the number of symptoms they endorse as present (M = 7.03, SD = 4.35); (t (119) = 16.58, $p < .001$). Parents however continued to report significantly more symptoms (M = 12.29, SD = 2.94) than adolescents (M = 10.57, SD = 4.15) when subthreshold symptoms were taken into account ($t(119) = -4.12$, $p < .001$). Adolescent report of ADHD symptoms was higher when subthreshold symptoms are taken into account, but adolescents with ADHD still did not report their symptoms to the same degree as their parents.

Examining Questionnaire Reports and Discrepancies Between Parent, Teacher, and Self-Reports of ADHD Symptoms and Comorbid Ratings of Difficulties and Impairment

Comparing ADHD symptoms and comorbid ratings among informants. A one-way repeated measures ANOVA was used to compare parent, self, and teacher reports on the total difficulties, emotional symptoms, ADHD, conduct problems, and peer problems subscales of the SDQ. See Table 2 for mean values.

Table 2

Mean symptom reports by parents, teachers, and adolescents on the SDQ total difficulties,

emotion symptoms, ADHD, conduct, and peer problem scales

	Parent-report M (SD)	Teacher-report M (SD)	Self-report M (SD)
SDQ Total Difficulties n = 111	17.41(6.06)	14.51(6.12)	14.75(5.80)
SDQ Emotional Symptoms n = 115	3.52(2.63)	2.64(2.33)	3.10(2.32)
SDQ ADHD Scale n = 117	7.56(1.95)	7.32(2.25)	6.39(2.36)
SDQ Conduct Problems n = 114	3.62(2.13)	2.18(2.38)	3.27(2.01)
SDQ Peer Problems n = 115	2.47(2.25)	2.21(2.14)	1.87(1.71)

When comparing the total difficulties score on the SDQ, there was a significant effect of informant, $F(2, 220) = 8.87, p < .001$. Post-hoc tests using a Bonferroni correction indicated that parent ratings of total difficulties were significantly greater than

both teacher ($p = .001$) and self-reports ($p < .001$), but teacher and self-reports did not differ ($p > .05$).

When comparing emotion symptoms scores on the SDQ using a repeated measures ANOVA, Mauchly's Test of Sphericity indicated that the assumption of sphericity had been violated, $x^2(2) = 6.46, p = .04$, and, therefore, a Greenhouse-Geisser correction was used. There was a significant effect of informant, $F(1.895, 215.998) = 4.71, p = .01$. Post-hoc tests using a Bonferroni correction indicated that parent ratings of emotion symptoms were significantly greater than teacher reports ($p = .01$), however, parent and self-reports ($p = .30$) and teacher and self-reports ($p = .41$) did not differ significantly.

As ADHD symptom reporting was the focus of this study, gender was added as an additional level of analysis when considering the ADHD scale on the SDQ. There was a significant effect of informant, $F(2, 230) = 6.38, p < .01$. The effect of gender was not significant, $F(1, 115) = 3.27, p = .07$. The informant by gender interaction was significant, $F(2, 230) = 10.53, p < .001$. The significant interaction was probed using interaction contrasts as follows: when comparing self versus parent reports, the interaction was not significant, $F(1, 118) = 1.09, p > .05$. When comparing parent versus teacher reports, the interaction was significant, $F(1, 116) = 12.11, p < .001$. The effect of gender differed for parent versus teacher reports on the SDQ ADHD scale. Teachers reported more ADHD symptoms for males than for females, $t(116) = 4.81, p < .001$, but parent reports of ADHD symptoms did not differ by gender. When comparing self versus teacher reports the interaction was significant, $F(1, 115) = 18.10, p < .001$.

Teachers reported more ADHD symptoms for males than for females, $t(116) = 4.81, p < .001$, but self reports of ADHD symptoms did not differ by gender.

When considering the conduct problems scale, there was a significant effect of informant, $F(2, 226) = 19.74$ $p < .001$. Post-hoc tests using a Bonferroni correction indicated that parent and self-reports did not differ significantly ($p = .36$). However, both parent ($p < .001$) and self-reports ($p < .001$) of conduct problems were greater than teacher reports.

When considering the peer problems scale, there was a significant effect of informant, $F(2, 228) = 3.58, p < .05$. Post-hoc tests using a Bonferroni correction indicated that parent and teacher reports ($p = .82$) and teacher and self-reports ($p = .38$) did not differ significantly in reported problems with peer relationships. However, parent reports of peer problems were greater than self-reports ($p < .05$). See Table 3 summarizing these findings.

Table 3

Summary of informant comparisons across SDQ scales

Scale	Differences
Total Difficulties	Parents > (Teachers = Adolescents)
Emotion Symptoms	Parents > Teachers; Parents = Adolescents, Teachers = Adolescents
ADHD	Parents > Adolescents, Teachers > Parents for males, Teachers > Adolescents for males
Conduct Problems	(Parent = Adolescent) > Teacher
Peer Problems	Parent > Adolescent, Teacher = Adolescent, Parent = Teacher

Gender was also examined in these analyses. Gender was added as a between subjects factor in the repeated measures ANOVA for each of the remaining scales (total difficulties, emotion symptoms, conduct problems, and peer problems). In each case, the gender by informant interaction was significant. Examination of interaction contrasts revealed the following: For the total difficulties scale, teacher report was driving the interaction, such that teachers reported more difficulties overall for males than for females, $t(110) = 5.00, p < .001$, while parent and adolescent reports did not differ by gender. For the emotion symptoms scale, both parents and adolescents reported more emotion symptoms for females than for males, $t(119) = -3.68$, $p < .001$ and $t(118) = -3.83$, $p < .001$, respectively. Teacher reports did not differ. For the conduct problems scale, teachers reported more conduct symptoms for males than females, $t(118) = 3.43, p < .001$, while parent and self reports did not differ by gender. For the peer problems scale, teachers reported more peer problems for males than females, $t(114) = 3.57, p < .001$. Parent reports for males versus females approached significance, $t(119) = 1.94, p = .06$ and self-reports did not differ.

Comparing self, parent, and teacher-reported impairment in adolescents with ADHD. A two by three way repeated measures ANOVA was used to compare total impairment on the SDQ across informants. Mauchly's Test of Sphericity indicated that the assumption of sphericity had been violated, $x^2(2) = 14.94, p < .001$, and, therefore, a Greenhouse-Geisser correction was used. There was a significant effect of informant, $F(1.775, 196.986) = 31.29, p < .001$. See Table 4 for mean values.

Table 4

Mean (SD) impairment ratings by parents, teachers, and adolescents (N = 113, males = 82, females = 31)

	Informant					
	Self		Parent		Teacher	
	Males	Females	Males	Females	Males	Females
SDQ Impairment	8.02(4.12)	9.23(4.72)	12.45(2.29)	11.68(3.36)	10.49(2.93)	7.73(3.56)

There was also a significant main effect of gender, $F(1, 111) = 4.40, p = .04$ and a significant informant by gender interaction, $F(1.775, 196.986) = 10.59, p < .001$. The significant interaction was probed using interaction contrasts. When comparing self versus parent reports, the overall interaction was significant, $F(1, 116) = 5.44, p < .05$; however, t-tests revealed the differences in means were not significant.

When comparing parent versus teacher reports, the interaction was significant, $F(1, 113) = 9.96, p < .01$. The effect of gender differed for parent versus teacher reports of impairment. Teachers reported more impairment for males than for females, $t(114) = 5.10, p < .001$, but parent reports of impairment did not differ by gender.

When comparing self versus teacher reports the interaction was significant, $F(1, 112) = 16.48, p < .001$. The effect of gender differed for self versus teacher reports of impairment such that self report of impairment was not significantly different for males compared to females. However, teacher reports of impairment differed significantly for males versus females with teachers rating males as more impaired than they rated females

as reported above. Thus, parents rated adolescents as significantly more impaired than teachers reported or adolescents self-reported. Teacher and adolescent reports did not differ significantly overall. With respect to gender, parents rated both males and females as highly impaired. While adolescent self-reports were more similar to overall teacher reports of impairment, adolescent self-reports did not differ by gender; however, teachers reported males as significantly more impaired than females. Figure 2 displays this interaction.

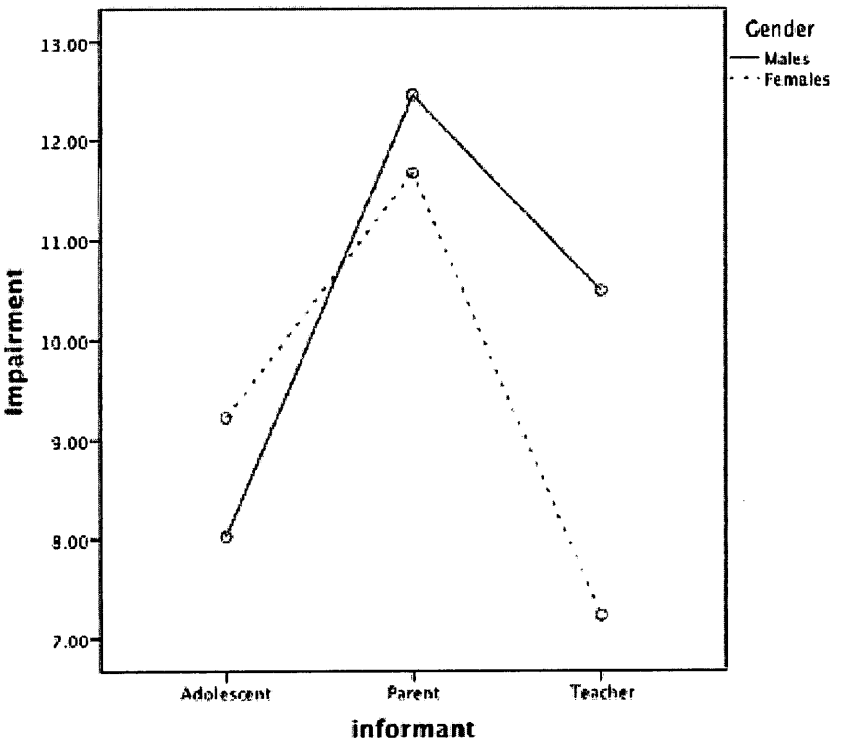

Figure 2. Informant by gender interaction for SDQ impairment reports.

Reports by each rater within each impairment item were also considered to examine the range of impairment reported by adolescents. That is, were adolescents

merely reporting a large number of 0's and 1's rather than reporting difficulties that were significantly impairing and long standing? It appeared that adolescents reported impairment across a range of severity. For instance, adolescents reported that their issues are causing them definite or severe difficulties, reported that their difficulties as having been present for a significant period of time, and saw their difficulties as causing quite a lot or a great deal of distress and interference in their lives. However, while adolescents did report significant impact, they tended to report a lower magnitude of impact (overall) as compared to their parents. See Appendix A for distributions of level of impairment reported by each rater.

Comparing Internal Consistency in Adolescent, Parent, and Teacher Report of ADHD Symptoms Across Instruments

Reliability analyses were compared on parent, adolescent, and teacher-reported SDQ symptom scales (e.g., emotion symptoms, conduct problems, ADHD, peer problems, prosocial behaviour) and on ADHD interview symptom reports. This approach was used to examine consistency of reports by adolescents and to compare consistency with that of other informants. This approach has been used in other studies for similar purposes (Adler et al., 2012; Hartung et al., 2005; Smith et al., 2000). Cronbach's alpha values are reported in Tables 5 and 6, respectively. Overall, parent (range .55 - .74) and self-reports (range .51 - .77) appear to be similarly consistent on the SDQ. Informal comparisons suggest teacher reports (range .72 - .78) displayed a trend of slightly higher alpha values than parents and adolescents, but these values were not

compared formally. However, most values for all three informants were near or above the recommended value of 0.70 (Field, 2005).

It is also important to note that the SDQ scales were each comprised of only five items. When examining internal consistency on the K-SADS-PL ADHD interview items, adolescents (range .81 - .87) demonstrated very consistent values compared to parents (range .45 - .78) on all symptom scales (e.g., across all 18 symptoms, the nine hyperactivity/impulsivity symptoms, and the nine inattention symptoms). Teachers (range .82 - .91) also demonstrated good internal consistency. Thus, when using these tools, adolescents with ADHD appear to be consistent reporters of their symptoms, at a level comparable to teachers and were in some cases more consistent than parents. It is important to note that this consistency is across different ADHD symptoms, and there are different possible explanations for these differences. What is worth noting is that all three informants seem to demonstrate relatively high and comparable levels of internal consistency.

Table 5

Cronbach's alpha values for parent, self, and teacher reported SDQ scales

	Parent SDQ	**Self SDQ**	**Teacher SDQ**
Scales (5 items)			
Emotional Symptoms	.743	.639	.767
Conduct Problems	.553	.572	.725
ADHD	.590	.765	.761
Peer Problems	.674	.514	.722
Prosocial	.744	.750	.781

Table 6

Cronbach's alpha values for parent, self, and teacher-reported interview scales

	K-SADS-PL Parent	**K-SADS-PL-Adolescent**	**TTI-Teacher**
18 ADHD symptoms	.676	.872	.896
9 Inattention symptoms	.453	.812	.815
9 Hyperactive/ Impulsive symptoms	.782	.850	.912

*Note: value > .7 considered acceptable, measure of internal consistency
TTI: n = 48-50, K-SADS-PL n = 120

Concurrent Validity of ADHD Symptoms Across Informants and Instruments

The SDQ self-report ADHD questionnaire scale was significantly positively correlated with interview self-report for ratings of total ADHD symptoms ($r = .63$, $p <$

.01), indicating high consistency across different instruments. Teacher and parent reports displayed a similar pattern. See Table 7 for values.

Table 7

Correlations across raters between interview (K-SADS-PL or TTI) and SDQ ADHD Scale

	SDQ ADHD Scale					
	Parent-report		Teacher-report		Adolescent-report	
	n = 119	n = 52	n = 51	n = 52	n = 119	n = 51
Interview –K-SADS-PL or TTI (18 symptoms)	.39**	.48**	.68**	.69**	.63**	.70**

**Correlation is significant at the .01 level (2-tailed).

The size of the correlations was compared across informants using syntax for comparing dependent correlations known as "Steiger Case B" (Steiger, 1980) in R software. For this analysis, a consistent sample size is needed, thus correlations were calculated using listwise deletion depending on which informants were being compared (see Table 7). This accounts for the differing sample sizes in Table 7, which are calculated based on the pair of informants being compared. The correlation between self reported questionnaire and interview symptoms (r = .63) was compared with the corresponding parent reported correlation (r = .39). This difference was significant, z = 2.53, $p < .01$, indicating a stronger association between adolescent interview and adolescent questionnaire report of ADHD symptoms than the association between parent interview and parent questionnaire reporting. The self-report (r = .70) and teacher report (r = .68) correlations were not significantly different, z = .12, p = .90. The parent-report

(r = .48) and teacher-report (r = .69) correlations were also not significantly different, z = -1.6, p = .10. These findings suggest that adolescents are more consistent in reporting their symptoms across questionnaire and interview than parents, but are similar to teacher reports.

Thus, there is consistent evidence to suggest that adolescents with ADHD are internally consistent in their reporting, and demonstrate concurrent validity at levels similar to or above those of parents and teachers, using questionnaires and interviews.

Understanding Individual Differences in Self-Report

Associations between ADHD symptoms and age. Correlations between age and ADHD symptom reports were examined. Adolescent self-reports of inattention symptoms were significantly positively correlated with age, r = .24, p < .01. Parent reports of symptoms of hyperactivity/impulsivity and overall symptom reports were significantly negatively correlated with age, r = -.27, p < .01, r = -.24, p < .01 respectively. Teacher reports were not significantly correlated with age.

Associations between ADHD symptoms and other symptom reports. Next, analyses were conducted to examine whether adolescents who report ADHD symptoms also report symptoms in other domains (i.e., total difficulties, emotion symptoms, conduct problems, ADHD, prosocial behaviour, peer problems, and impairment) on the SDQ and whether there are differences in these associations across informants. Adolescent reports of symptoms on the K-SADS-PL interview were significantly correlated with self-reports on the SDQ total difficulties, emotion symptoms, ADHD, conduct problems, prosocial behaviour and impairment scales. That is, adolescents who

reported more ADHD symptoms on the K-SADS-PL interview also reported more difficulties on the listed SDQ domains. These results are shown in Table 8.

Associations between parent-reports (K-SADS-PL) and SDQ and teacher reports (TTI) and SDQ were also examined. Parent reports of ADHD symptoms on the K-SADS-PL interview were significantly correlated with the parent-reports on the SDQ total difficulties, conduct problems, ADHD, and impairment scales. The parent-reported emotion symptoms, peer problems, and prosocial behaviour scales were not correlated with parent reports of ADHD symptoms. In general, correlations between parent reports were in the small range (r = .21 - .39), while associations between adolescent reports were in the medium to large range (r = .44 - .63).

Teacher reports of ADHD symptoms on the TTI interview reflected a similar pattern as the adolescent self-reports such that teachers reported significant correlations between ADHD symptoms on the TTI and scores on the SDQ total difficulties, conduct problems, ADHD, and the impairment scales. However, in contrast to the parent and adolescent findings, teacher-reported ADHD symptoms were also significantly correlated with the peer problems scale, indicating that according to teacher report, adolescents with more ADHD symptoms experience more peer problems (See Table 8). Overall, these results suggest that adolescents who self-report ADHD symptoms also report symptoms in other areas and in impairment. These associations follow similar patterns to parent and teacher symptom reporting.

Table 8

Correlations between interview reported ADHD symptoms and SDQ scales

	Total Difficulties	Emotion Symptoms	Conduct Problems	ADHD	Peer Problems	Prosocial Behaviour	Impairment
Parent-report							
K-SADS-PL Interview Total ADHD symptoms	.30*** n=120	.01 n=120	.31*** n=120	.39*** n=120	.15 n=120	-.04 n=120	.21** n=120
Adolescent-report							
K-SADS-PL Interview Total ADHD Symptoms	.57*** n=119	.30*** n=119	.55*** n=119	.63*** n=119	.01 n=119	-.20* n=119	.44*** n=118
Teacher-report							
TTI Total ADHD Symptoms	.49*** n=50	.13 n=52	.33* n=51	.69*** n=52	.28* n=51	-.17 n=51	.41** n=52

**Correlation is significant at the .001 level (2-tailed).
**Correlation is significant at the .01 level (2-tailed).
*Correlation is significant at the .05 level (2-tailed).

Identifying a group of adolescents diagnosed with ADHD who report high levels of ADHD symptoms. The frequency distribution of adolescents who self-report ADHD symptoms was examined in order to determine the composition of the bottom and top thirds of the distribution to examine low and high ADHD symptom self-report groups. It is important to note that this frequency distribution was relatively normally distributed, with a very small positive skew (skewness = .18) and was slightly negatively kurtosed (kurtosis = -.78); both values were within acceptable limits. This distribution is

displayed in Figure 3. The self-report groups were comprised as follows to generate approximately equal numbers of participants in the lower and upper tails: Low: <= 4 symptoms, 30.8% of sample, n = 37 and High: >= 10 symptoms, 30% of sample, n = 36 (Mid range: 5 – 9 symptoms, 39.2% of sample, n = 47). These groups were then compared on several variables to examine any differences between low and high self-reporters of ADHD symptoms.

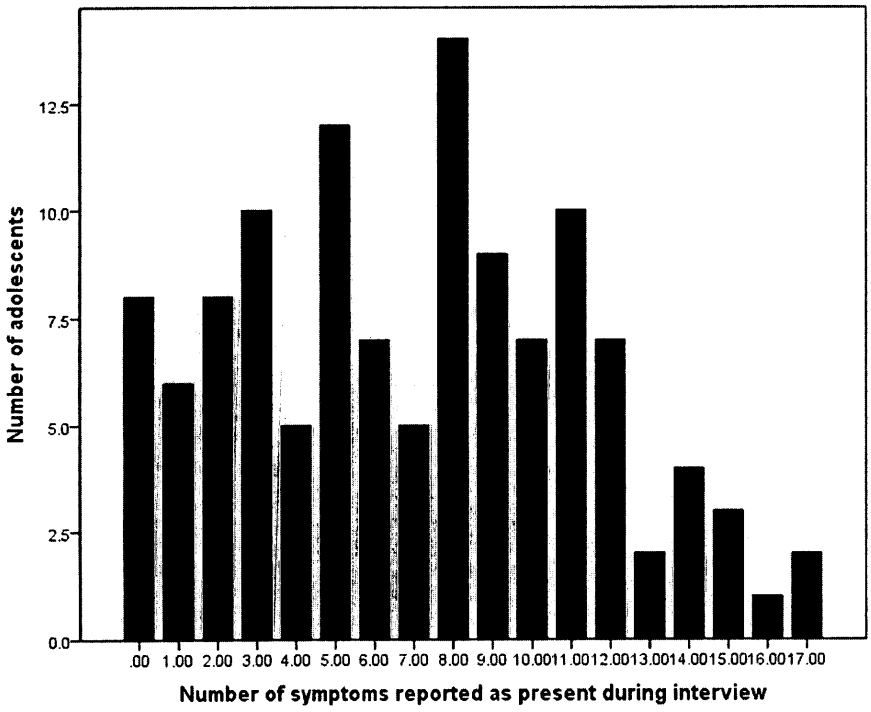

Figure 3. Frequency distribution of self-reported symptoms.

The low self-report group reported a mean of 1.46 (SD = 1.22, range = 4) symptoms of inattention and a mean of .49 (SD = .73, range = 3) symptoms of hyperactivity/impulsivity. The high self-report group reported a mean of 7.08 (SD =

1.59, range = 6) symptoms of inattention and a mean of 5.17 (SD = 2.03, range = 8) symptoms of hyperactivity/impulsivity.

Comparing adolescents who report high and low levels of ADHD symptoms. There were no gender differences in the level of self-reported ADHD symptoms (low, high) reported ($x^2(1) = .72, p = .45$). Males and females reported similar numbers of ADHD symptoms as present, that is, 36% of females and 28% of males rated 10 or more symptoms as present. Values are displayed in Table 9. A one-way ANOVA revealed that age did not differ between the high (M = 15.34, SD = 1.64) and low (M = 14.72, SD = 1.24) groups, $F(1, 72) = 3.37, p = .07$.

Table 9

Gender by symptom report group

Level of Self-reported symptoms	Gender		
	Males	Females	Total
Low	28	9	37
High	24	12	36
TOTAL	52	21	73

The low and high self-report groups were compared on comorbidity ratings in Table 10. Frequencies of diagnosed comorbid conditions were similar between the low and high self-reported ADHD symptom groups. However, statistical comparison across low and high groups of these differences was not possible due to the small cell sizes. Chi-squares tests were used to examine whether self-reported impairment (on the SDQ) differed between the low and high symptom self-report groups. Adolescents in the high

self-report group were more likely to report that they experienced more difficulties in a variety of areas, $x^2(1) = 6.40, p = 0.01$ and that their difficulties cause quite a lot or a great deal of interference in their classroom learning, $x^2(1) = 8.74, p < 0.01$ than the low report group. The chi-square tests examining self-report group (low, high) by impairment in peer relationships and for those around the adolescent were not significant.

Age or gender did not differentiate between the high and low self-reporters. However, adolescents who reported high levels of ADHD symptoms also reported more impairment in certain areas, compared to the low reporting group.

Table 10
Comorbidity by symptom group

	Category			
	"No"		"Yes"	
Comorbidity	Group (Low n = 37, High n = 36)			
	Low	High	Low	High
Oppositional Defiant Disorder	30	29	6	6
Conduct Disorder	35	31	1	4
Anxiety Disorder	26	25	10	10
Mood Disorder	32	31	4	4
Learning Disability	23	24	13	11
Other DSM diagnosis	36	34	0	1

*1 participant was missing comorbidity data.

Examination of age in line with DSM-5 changes. Given the recent DSM-5 finalization of different diagnostic parameters for adolescents aged 17 and up versus those 16 and under and the consideration of adolescents 17 years old and above as adults, it was of interest to examine this age distinction in the current sample, where feasible, in order to generate some preliminary findings. There were 22 adolescents in the sample who were 17 or 18 years old. The following section describes results in this area.

A two (age) by two (informant) way repeated measures ANOVA was conducted comparing parent and self-reported interview (K-SADS-PL) symptoms in adolescents aged 16 and under and those 17 and above. Teacher interview reports were not included due to the limited number available. The main effect of informant was significant, $F(1, 118) = 13.61, p < .001$. There was also a significant informant by age interaction, $F(1, 118) = 7.70, p < .01$. Tests of simple main effects revealed that for adolescents 16 years old and younger, parent reports of symptoms were significantly higher than adolescent self-reports, $F(1, 118) = 59.69, p < .001$. For adolescents aged 17 and above, self and parent reports did not differ significantly, $F(1, 118) = .25, p = .62$. While parents reported more symptoms for older adolescents and less for younger adolescents and adolescents reported more symptoms with increasing age, the decrease in the parent reported mean was significant, $F(1, 118) = 4.07, p < .05$, while the change in adolescent report was not, $F(1, 118) = 2.15, p = .15$. Table 11 displays mean values. See Figure 4 for a depiction of this relationship.

Table 11

Mean number of symptoms reported by adolescents and parents on K-SADS-PL interview by age

	Age	
Informant	16 years old or less (N=99)	17 or 18 years old (N = 21)
Adolescents	6.76(4.37)	8.29(4.17)
Parents	10.12(2.92)	8.76(2.14)

On the SDQ, a two (age) by three (informant) way repeated measures ANOVA was conducted comparing, self, parent, and teacher reported questionnaire symptoms of ADHD in adolescents aged 16 and under and those 17 and above. The main effect of informant was significant $F(2, 230) = 4.68$ $p < .01$. The effect of age and the age by informant interaction were not significant. Tests of simple main effects revealed that for adolescents 16 and younger, teacher and parent reports did not differ, $p = .63$; however, adolescent self-reports were significantly less than both teacher ($p < .05$) and parent ($p < .001$) reports. For older adolescents there were no differences in reports among adolescents, parents, and teachers. See Table 12 for mean values.

Table 12

Mean score on SDQ questionnaire ADHD scale reported by adolescents, parents, and teachers by age

	Age	
Informant	16 years old or less (N=96)	17 or 18 years old (N = 21)
Adolescents	6.32(2.43)	6.71(2.00)
Parents	7.61(2.06)	7.29(1.31)
Teachers	7.24(2.29)	7.71(2.08)

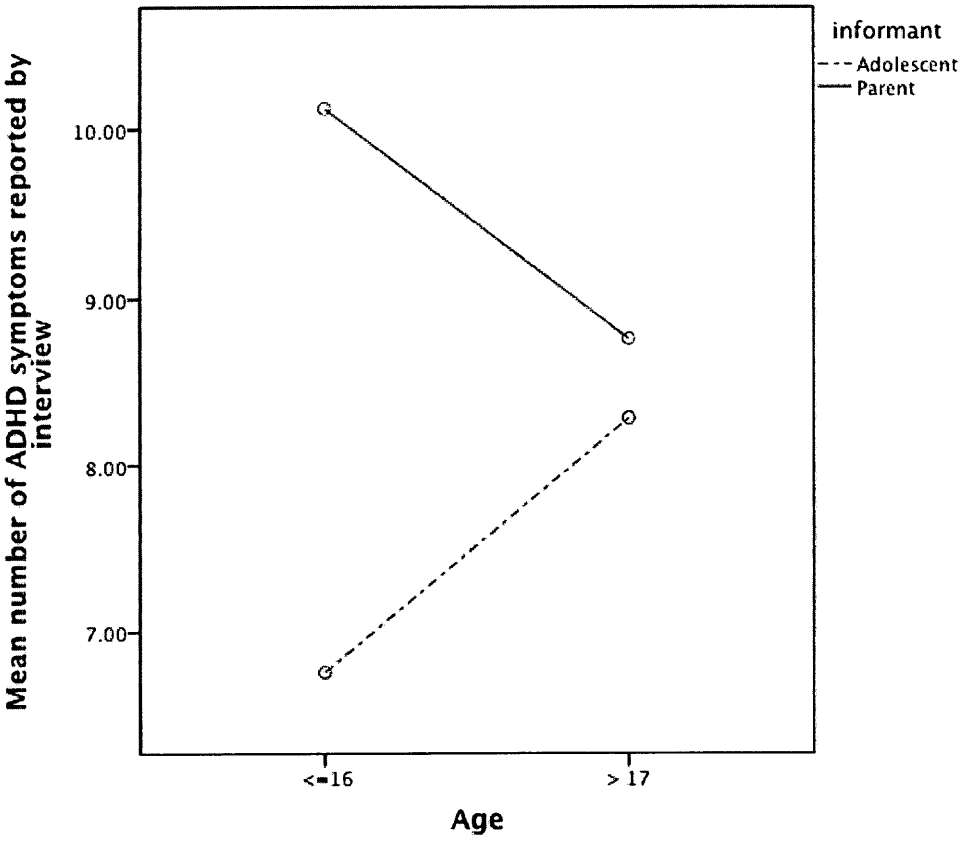

Figure 4. Symptoms reported by adolescents and parents on the K-SADS-PL interview at 16 years of age or less and at age 17 and above.

Discussion

Summary of Findings

All of the following findings reflect informant comparisons of ADHD, impairment ratings, and ratings of other behaviour domains of adolescents diagnosed with ADHD. Interview reports revealed that parents reported significantly more ADHD symptoms in adolescents when considering all 18 symptoms or solely inattention symptoms compared to adolescents; however, adolescents did not differ from their teachers in reporting of symptoms. When examining symptoms of hyperactivity/impulsivity only, there were no differences between parents, adolescents, and teachers. Reports of impairment followed a similar pattern, in that parents reported more impairment than adolescents and teachers reported overall; however teachers differed in their reports for males and females. Adolescent self-reports of impairment did not differ significantly from overall teacher reported impairment; however, teachers reported male students to be more impaired than female students. Behaviour and emotion symptom scales on questionnaire were also examined. Generally parents reported more symptoms than adolescents or teachers on the SDQ; however, findings varied depending on the scale being examined and teachers reported males to experience more symptoms of ADHD, total difficulties, peer, and conduct problems, and impairment, while adolescent and parent reports did not differ by gender. Adolescents with ADHD were internally consistent in their reporting and demonstrated concurrent validity with other ADHD ratings at levels similar to or above those of parents and teachers. When high and low self-report groups were examined there were no gender or age differences between

groups; however, groups did differ significantly on some areas of reported impairment. A preliminary examination of reports by older (age 17 or 18) and younger adolescents (16 and younger) was also conducted. Consistent with previous findings, on interview, parents reported more symptoms than adolescents self-reported; however, this was only the case for adolescents 16 years old and younger. There was no difference in reports between parents and adolescents in the 17/18 year old group. On questionnaire, for younger adolescents, parent and teacher reports did not differ, but were greater than adolescent reports. For older adolescents there were no differences between informant reports. Table 11 summarizes these findings by the research questions in this study.

Table 13

Summary of key findings by research area

Research Area	Results
1. Examining interview reports of ADHD symptoms	• Adolescents reported a mean of 7.03 symptoms, parents 9.91, teachers 7.92. • 30% of adolescents endorsed ≥ 10 symptoms present all of the time. • Parents reported more inattention symptoms than adolescents and teachers, who did not differ. • There were no differences between informants on reports of symptoms of hyperactivity/impulsivity. • Symptom reports did not differ by gender.
2. Examining questionnaire reports and discrepancies among informant ratings of symptoms and impairment	• Parents reported more total difficulties and emotion symptoms than adolescents and teachers, who did not differ. • Parents reported more ADHD symptoms than adolescents, teachers reported more ADHD symptoms than parents and adolescents for males only. • Parent and adolescent reports of conduct problems did not differ, but both were greater than teacher reports.

	• Parents reported more peer problems than adolescents, however, teacher and adolescent and teacher and parent reports did not differ. • Teachers reported higher scores for males on the total difficulties, ADHD, conduct problems, and peer problems scales. Adolescents and parents reported higher scores on the emotion symptoms scale for females. • Parents reported significantly more impairment than adolescents and teachers who did not differ overall. Teachers reported males as more impaired than females.
3. Internal consistency	• Adolescents demonstrated good internal consistency on SDQ symptom scales and on ADHD symptom reports on the K-SADS-PL interview and at levels similar to parents and teachers.
4. Concurrent validity	• Adolescents demonstrated good concurrent validity as evidenced by strong correlations between symptom reports across different measures of ADHD symptoms, comparable to parents and teachers.
5. Individual differences in self-report	• Adolescent reports of ADHD symptoms were correlated with reports in other areas of functioning on the SDQ; parent and teacher reports followed a similar pattern. • High and low symptom report groups differed on impairment reports, but did not differ by age, gender, or comorbidity. • Preliminary exploration of the current data supports the DSM-5 conclusion to treat older adolescents similarly to adults in that their reports did not differ from parent or teacher reports.

Examining Symptom Reports Using Interviews and Rating Scales Across Adolescents, Parents, and Teachers

The findings in the current study suggest that adolescents diagnosed with ADHD do report symptoms, particularly, when employing a semi-structured interview format. While there was variability in reporting across the sample as evidenced by the frequency

distribution displayed and large standard deviation values, on average, adolescents with ADHD reported a mean of 7.03 symptoms of ADHD during a semi-structured interview as present all of the time. This number is above the DSM-IV clinical cut-off of 6 symptoms. In a similar study comparing interview reports on the DICA-R of ADHD symptoms, Hope and colleagues (1999) reported a significant difference between parent and adolescent reports of ADHD symptoms. This sample included adolescents diagnosed with internalizing and externalizing disorders, as well as controls. Despite statistically significant disagreement between parent and adolescent reports, adolescents reported a mean of 8.3 symptoms of ADHD in the Hope et al. (1999) study, similar to the values in the current study. These authors concluded that adolescent self-report of symptoms was valuable and consideration of adolescent self-report should be a part of practice.

When comparing informant reports across interviews, parents reported significantly more symptoms than both adolescents and teachers. Importantly, adolescent reports of ADHD symptoms were consistent with what their teachers reported, who are considered reliable and valid reporters (Evans, Serpell, Schultz, & Pastor, 2007). This finding was consistent when examining all 18 symptoms of ADHD or solely symptoms of inattention. When examining symptoms of hyperactivity/impulsivity only, there were no differences among reporters. This finding is consistent with the developmental trajectory of ADHD, such that symptoms of hyperactivity or impulsivity become less predominant with increasing age, while symptoms of inattention become paramount (Barkley, 2006; Sibley, Pelham, Molina, Gnagy, Waschbusch et al., 2012).

Hogue et al. (2012) found similar findings to the current study in terms of interview symptom reports by adolescents and caregivers in a sample of individuals with a variety of diagnoses. Differences were found between parents and adolescents in the area of inattention with no differences regarding symptoms of hyperactivity/impulsivity. Another consistent finding was that all informants reported more symptoms of inattention than hyperactivity/impulsivity, which further supports the reported developmental trajectory of ADHD (Barkley, 2006; Sibley, Pelham, Molina, Gnagy, Waschbusch et al., 2012).

The current findings suggest that parents and adolescents show fairly consistent reports with respect to the level of endorsed symptoms of hyperactivity or impulsivity. There was more disagreement between parents and adolescents with respect to symptoms of inattention, but it does not appear to be the case that adolescents diagnosed with ADHD do not report symptoms of inattention. Instead, adolescents report on symptoms of inattention and simply endorse them at a less severe level relative to parents. However, adolescents diagnosed with ADHD reported symptoms at levels similar to teachers. These findings suggest that parents report higher levels of symptoms relative to both teachers and adolescents, who do not differ.

It is important to consider the significance and meaning of these reporting differences. When adolescent symptom reports were examined taking sub threshold endorsement of symptoms into account, adolescents reported on average 3.5 more symptoms, a significant increase from their previous reports. Specifically, adolescents reported a mean of 10.57 symptoms on interview as compared to 7.03 when sub threshold

reports were taken into account. The level of parent-reported symptoms also increased when sub threshold symptoms were included, although not by the same magnitude as adolescent report did. This finding suggests that adolescents with ADHD recognize their difficulties, but perhaps not to the same magnitude or impact as their parents (American Academy of Pediatrics, 2011; Danckaerts et al., 1999; Smith et al., 2000).

Increased symptom reporting by parents, relative to adolescents, was also consistent on the SDQ scales. Parents reported more overall difficulties, ADHD symptoms, and peer problems than adolescents reported. Teachers and adolescents were consistent in their reports of total difficulties, emotion symptoms, and peer problems on the SDQ. With respect to the emotion symptoms scale, adolescents were consistent with teacher and parent reports. Other evidence (Barkley, 2006) suggests adolescents in general are reliable reporters with respect to their internalizing symptoms and are to be relied upon in this area. On the SDQ ADHD scale, teachers did report ADHD symptoms at levels similar to parents, which were greater than adolescent reports. This discrepancy between teacher and adolescent reports of ADHD symptoms on the SDQ is not consistent with the teacher and adolescent reports of ADHD symptoms by interview. When considering the ADHD scale, methodology likely played a role in this instance. While the SDQ has an ADHD scale, it is limited in its coverage of ADHD symptoms and is comprised of five items. In addition, it is important to recall that the SDQ is a pen and paper questionnaire as compared to an interview, where adolescents seemed to be more on par with other reports, especially with respect to teachers. This is an important finding as it may suggest that adolescents provide more consistent and accurate reports of ADHD

symptoms by interview rather than by self-report questionnaire. There is some literature to suggest that self-report by adolescents with ADHD is ideally collected by semi-structured interview (Hartung et al., 2005), rather than questionnaire, as some have suggested individuals with ADHD may be more likely to rush through questionnaires (Sibley et al., 2010).

Comparing self, parent, and teacher-reported impairment in adolescents with ADHD. An interesting relationship across informants emerged when impairment reports were examined. Impairment values were larger in parent reports relative to adolescent report; however, adolescents with ADHD reported impairment across the range of severity of this scale, just did so at a lower magnitude overall compared to parents. Teachers reported less impairment than parents, but were comparable to adolescents. Overall parents viewed their adolescents as more impaired relative to teacher and adolescent reports. This finding converges with other findings in this study supporting the higher reporting of symptoms and behaviours by parents in previous analyses, while teacher and adolescent reports of impairment did not differ overall. This work contradicts a recent study by Sibley, Pelham, Molina, Gnagy, Waschbusch et al., (2012) that found adolescents with ADHD rated both symptoms and impairment significantly lower than parent and teacher reports, but instead provides further evidence for adolescent report of impairment. Despite these differences across studies, our findings would be consistent with Sibley et al.'s (2012) suggestion to increase emphasis on adolescent reports of level of impairment.

This exploration of symptom and impairment reports across informants demonstrates that overall, parents generally reported the highest levels of symptoms and impairment; however, teacher and adolescent reports were similar in many cases.

Teachers are considered to be valid and necessary reporters of ADHD symptoms in adolescence (Evans, Serpell, Schultz, & Pastor, 2007; Sibley et al., 2012). The fact that there was consistency between teacher and adolescent report would suggest evidence for the credibility of adolescent self-report. Teachers are considered well-validated and informed reporters (Pliszka, 2007; Sibley et al., 2012), but in the current study parents reported more symptoms and impairment than teachers. There are several reasons for these differences in reporting, from informant bias to expected differences in reporting. Part of the variability in reporting should be regarded reflecting the contextual nature inherent in the presentation of ADHD. This is acknowledged in the DSM-IV (APA, 2000) with the pervasiveness criteria, and is even reflected in clinical interviews such as the TTI, which asks several questions regarding the context of behaviour. Informant differences should be expected, particularly due to the contextual nature of ADHD, which is even a part of diagnostic criteria. For example, low academic achievement in school is a salient indicator of impairment that is easily apparent to both teachers and adolescents, but the impairment experienced at home may not be equally apparent to both parents and adolescents, as the indicators may be less evident and objective.

It is of particular interest to understand the pattern of reported symptoms across adolescents, parents, and teachers. There are several reasons why parents of adolescents with ADHD report significantly more symptoms than both adolescents and teachers.

Parents may have a more limited frame of reference when describing their child. For instance, parents are able to contrast their child's behaviour with perhaps one or two siblings, or may make comparisons with a particular youth, rather than to same aged peers without ADHD (Adler & Newcorn, 2011). In addition, parents have decreased opportunities in which to observe adolescents' behaviour compared to when their teen was younger, as adolescents spend more and more days and nights away from adult supervision (Adler & Newcorn, 2011; Whalen et al., 2002). Lower levels of psychopathology identified by teachers relative to parents has also been found in other studies (Rettew et al., 2011; Youngstrom, Loeber, & Stouthamer-Loeber, 2000). Given the training and daily experiences of teachers, they may also have a higher tolerance or threshold for behaviour in students, relative to the more limited exposure of parents. There are also a number of studies linking parental psychopathology with increased endorsements of child symptoms (Offord et al., 2006; van der Toom, Huizink, Utens, Verhulst, Ormel, & Ferdinand, 2010) and parental psychopathology could have played a role in the increased levels of parent reported ADHD symptoms in the current study. Thus, there are several reasons suggesting parent reports may be elevated relative to adolescent reports, that do not bear on the validity of adolescent self-report. Similarly, there are a number of reasons why teacher report may be less elevated relative to parent report and more in line with adolescent reports.

Summary of findings. When considering mean values of symptom reports by interview, teacher and adolescent symptom reports were much more similar than parent values, suggesting that adolescents do report their symptoms at a level similar to that of

teachers, who are considered important and valid reporters in the area of ADHD (Evans et al., 2007; Sibley et al., 2012). Reports on the SDQ total difficulties scale further supports this conclusion, as teacher and adolescent reports did not differ. The current results indicate that adolescents do report ADHD symptoms by questionnaire and by interview, but at lower levels than their parents, however, report similarly as compared to teachers. That is, while both teacher and parents have been established as valid informants in the area of adolescents with ADHD in the literature (Pliszka, 2007; Sibley et al., 2012), in many cases their reports differed substantially in the current study, such that parents often reported higher values relative to teachers. Overall, these results suggest that using a semi-structured clinical diagnostic interview, adolescents with ADHD report their symptoms at a level that is comparable to what their teachers report. Using questionnaire, adolescents report slightly less symptoms than parents or teachers; however, still report a large enough number of symptoms to elicit clinical attention.

Smith (2007) proposed a ranked method of best informants in deciding how to use conflicting informant information. This method is based on age (younger versus older), setting (inpatient versus outpatient), and problem (internalizing versus externalizing) developed following a comprehensive review of studies. With respect to older outpatient clients with externalizing symptoms, teachers were listed as the best informant, followed by self-report, then by parents. For older outpatients with internalizing symptoms, the child was cited as the best informant, followed by the parent, then the teacher. Consistent with Smith (2007), the current study would suggest an increased emphasis on the use of adolescent self-report in the area of ADHD. The DSM-V guidelines for treating older

adolescents (age 17 and above) as adults and hence using the decreased diagnostic threshold reserved for adults is also in line with this study.

Examining Internal Consistency in Adolescent and Informant Report of ADHD Symptoms Across Instruments

In order to examine the extent to which informants endorse symptoms as well as their reporting characteristics, reliability analyses were conducted on questionnaire reports as well as symptoms reported by interview. Cronbach's alpha values for teacher reports on both the SDQ and TTI were consistently above the recommended value of .70 (Field, 2005). Values for adolescent reports on the interview were also consistently above .70, as well as on the ADHD scale on the SDQ questionnaire. Some values for parent report questionnaire were more variable, with alpha values falling above and below .70 on the SDQ. The parent and adolescent values were in line with those in the Hartung et al. (2005) study reporting alpha values for adolescent and parent interview (values ranged from .84 - .93 for parents and .66 - .82 for adolescents) and questionnaire (values ranged from .86 - .94 for parents and .67 - .83 for adolescents). Adolescent and teacher alpha values were also similar to internal consistency (alpha values) reported by Smith et al. (2000). Adolescent values on the SDQ questionnaire were also in line with the Conners 3 (Conners, 2008) self-report measure. These analyses suggest that adolescents are internally consistent when reporting on ADHD symptoms by interview, and their consistency is similar to that of parents and teachers reporting on similar measures.

Concurrent Validity of ADHD Symptoms Across Informants and Instruments

Correlations between questionnaire and interview were also examined to determine whether informants report symptoms consistently across different reporting instruments. Adolescents who reported more ADHD symptoms by interview also endorsed higher levels of symptoms on the ADHD scale of the SDQ questionnaire. Teacher and parent reports followed a similar pattern; however, the correlation between adolescent reports was significantly larger than the association between parent reports. Within informant consistency is in line with findings by Hope et al. (1999) demonstrating significant moderate to high correlations (r = .63) between adolescent interview reports and questionnaire data. Taken together, these findings indicate that adolescents diagnosed with ADHD report symptoms of ADHD consistently across instruments, comparable to parent and teacher reports.

Individual Differences in Self-Report

High versus low self-reporters. The comparison of high and low self-report groups was used to examine individual differences in those who report many ADHD symptoms and those who report few. Within the current sample of adolescents diagnosed with ADHD, self-reports of ADHD symptoms were normally distributed. The high report group (who self-reported 10 or more ADHD symptoms as present), was compared with adolescents who reported four or less symptoms. Neither gender nor age differentiated the low and high groups. Statistical comparison of comorbid diagnoses across groups was not possible due to small cell sizes; however, frequencies of comorbid diagnoses were similar across groups (see Table 10). However, future studies should examine the presence of oppositional/conduct disorder in a larger sample of participants

with ADHD, as it has been suggested that children with ODD/ADHD may demonstrate limited reflection or distort responses in socially desirable way (Barkley, 2006, p.352). Anecdotally we did see this with some qualitative reports with respect to adolescents who reported no concerns in the open-ended portion of the K-SADS-PL interview, i.e., "nothing's wrong," were also adolescents with a number of behaviour issues (e.g., school truancy, suspensions, defiant behaviour).

Adolescents who self-reported symptoms also reported impairment to some degree. Interestingly, adolescents in the high self-report group indicated they experienced more difficulties in a variety of areas and in particular more impairment in their classroom learning. Notably, there were no differences in the level of self-report and adolescent endorsed degree of impairment in peer relationships and for others around the adolescent. Thus, it appears that these adolescents can recognize impairment or interference that is "personal" such as recognizing that they have difficulties in general and in classroom functioning. However, the high and low groups did not differ in terms of having insight into the impact their difficulties may have on others (i.e., in peer relationships and for others around them). This finding suggests that adolescents who recognize and report on their ADHD symptoms also recognize the impact symptoms have on them; however, perhaps not how their symptoms impact others. However, one could argue the influence of typical adolescent egocentrism (Santrock, 2005) may contribute to this finding. These findings are an important area for future investigation and suggest treatment implications may also be different for the high versus low self-reporters of ADHD symptoms.

Examination of age in line with DSM-5 changes. Using the limited number of older adolescents in the current sample, on interview and questionnaire, parent, adolescent, and teacher reports did not differ in the group of older adolescents. These findings would support the DSM-5 conclusion to lower the diagnostic threshold for older adolescents and regard them as similar to adults, given these adolescents' reports of ADHD symptoms do not differ from other informant report across interview or questionnaire. That said, consistent with previous findings, while statistically lower relative to parent reports, adolescents in the 16 and younger group still reported symptoms at a level warranting clinical concern.

Understanding Differences in Informant Report

Limits of comparing informants. While collecting and comparing self, teacher, and parent reports offer very rich informant information, one of the challenges present is deciding on who is the most "accurate" informant. In fact, it may be the case that no one report or opinion is "right" but variability inherent in reports by multiple informants is necessary and expected (Hope et al., 1999), especially with respect to the contextual differences inherent in ADHD. In fact, Stanger and Lewis (1993) reported it is not unusual that measures of the same construct completed by different individuals are less related than measures of different constructs completed by the same individual. Thus, there is a need to also pursue the examination of some other objective outcome measures that are linked with ADHD, such as substance use or school difficulty. A focus on informant discrepancies and attempting to determine who is to be relied upon is not sufficient, as there is no way to define an "accurate" informant (De Los Reyes, 2011).

Research showing discrepancies and overlap between informants illustrates the need to move beyond simply looking at only informant report and future research needs to tie these reports to observable outcomes.

Considering a developmental perspective. It was predicted that age would be associated with increased symptom reporting, given the cognitive changes occurring during adolescence that may support reporting capabilities. This hypothesis was partially supported. Age was positively correlated with adolescent reported symptoms of inattention; however, this finding was not consistent across informants. This correlation was significant, but small, and age did not differentiate low and high self-report groups. However, when examining the small group of adolescents aged 17 or 18 separately, differences in symptom reports among informants were no longer statistically significant. This preliminary data would suggest older adolescents are similar to parents in their reports. However, longitudinal analyses of symptom reporting are required to examine the processes occurring in symptom reporting among informants over time. Symptom reports across informants did fit with a developmental trajectory of ADHD, in reflecting an increase in inattention symptoms. Interestingly, agreement with parents also fits with this developmental trajectory. Symptoms that are known to be present to a lesser degree (hyperactivity, impulsivity) during this period were reported consistently between parents, teachers, and adolescents; however, inattention, which is the predominant symptom area during this period of development, remained an area of discrepancy between parents and adolescents. There were consistent findings that parents report more symptoms relative to both adolescents and teachers. This suggests that some of the

developmental changes resulting in more challenges or barriers to observation by parents, are supported by a disconnect in parent-adolescent reports. In general, results support taking developmental context into account and promotes the use of adolescent specific guidelines.

Stigma and attributions. A recent analysis of ADHD group postings on Facebook also supports the idea that adolescents have insight into ADHD symptoms and experiences (Gajaria, Yeung, Goodale, & Charach, 2011). Adolescents and young adults posting in these groups suggest youth are aware of stigma regarding ADHD, are developing an identity in the context of their illness, discuss positive aspects and frustrations of having ADHD, and are processing the effect of ADHD on their current and future lives. Novel work by Brinkman et al. (2012) consisted of a comprehensive qualitative study of the themes and ways adolescents think about and understand their ADHD. The pursuit of this type of work and results also support the insight of adolescents with ADHD into their disorder. The Attribution Bias Context Model (De Los Reyes & Kazdin, 2005) has also been suggested as an explanation for informant discrepancies. This model suggests that discrepancies exist due to informant differences in their attributions of the causes of behaviour assessed, biases in beliefs whether behaviours require treatment, and the contexts in which behaviours are either observed or reported, all features that would apply to ADHD symptom reporting.

Gender Effects

Some gender differences were also observed in the current study. With respect to symptom endorsement, there were no gender differences in self, parent, or teacher reports

when considering all ADHD symptoms, solely inattention symptoms, or symptoms of hyperactivity/impulsivity on interview. Hogue et al. (2012) did find a gender difference in parent reports of inattention symptoms, whereas in the current study there were no gender differences among informants with respect to interview-reported symptoms. On the SDQ, only teachers reported males as higher on the ADHD scale, while parent and self-reports did not differ by gender. This difference emerged only on the SDQ questionnaire, not during teacher interview or for parents on any measure of ADHD symptoms. There are several possible explanations for this gender difference in teacher reported symptoms by questionnaire. It could be that symptoms were more visible for males in the classroom, males were actually demonstrating more symptoms of ADHD in the school setting, or teachers may be more attuned to boys with ADHD, thus did report on and see the less noticeable inattentive symptoms in boys. There is some evidence to support gender differences in reporting of ADHD symptoms among teachers. With respect to gender, Derks, Hudziak, & Boomsma (2007) found that teachers report less inattention in girls than boys in children with ADHD. Rettew et al.'s (2011) examination of problems that were home or school specific, reported that there were proportionately more girls with home-specific problems only, suggesting teachers may not report inattention and hyperactivity in girls as commonly as in boys.

When considering impairment, teachers rated males as significantly more impaired than females. While parents reported significantly more impairment than was self-reported, male and females did not differ with respect to parent or self-reports of impairment. Interestingly, significant gender differences only emerged in teacher reports

where males were reported as more impaired by their teachers, but did not differ from females with respect to parent and adolescent self-reports. This finding is consistent with gender differences in teacher reports of ADHD, conduct, and peer problem reports on the SDQ where males were reported to exhibit more symptoms, thus it would follow that teachers may also view males as more impaired.

There is limited work examining gender differences in adolescents with ADHD; however, one study by Rucklidge and Tannock (2002) examined parent, self, and teacher reports of males and females with ADHD and control participants. Similar to the current findings, parents viewed males and females as similarly impaired in this study. The current findings differed from Rucklidge and Tannock's work where teachers did not view females as more impaired than males and parents reported more symptoms of hyperactivity for females. In the current study teachers viewed males as being more impaired than females and there were no gender differences in parent reported hyperactivity. It is important to note that differing methodology, (comparisons using questionnaires, i.e., the Conners' scales in the Rucklidge and Tannock study), rather than adolescent interview, as was the case in the current study when symptom reports were examined, may have accounted for some differences in results. Furthermore, there were a limited number of females in the current study, thus power was likely a factor in outcomes.

Clinical Implications

The current findings offer a number of important implications, especially in the area of assessment for ADHD. As discussed above, results seem to suggest that

adolescents recognize their symptoms and impairment, however at a slightly less, yet clinically significant levels relative to parents. Thus, the issue of "under reporting" may be best understood as one of magnitude, rather than a lack of recognition altogether. This argument is further supported by increases in reports when sub threshold endorsements were considered. As such, there are a number of issues that may comprise barriers to adolescent reporting. Nahlik (2004) emphasizes in particular the importance of establishing a trusting relationship with the adolescent in his work examining issues specific to the diagnosis of ADHD in adolescents. Building rapport and conveying acceptance, in a one-on-one setting without parents present may be particularly important with these clients in order to provide the ideal environment in which to obtain information. In his work highlighting the importance of the perspective of adolescents with ADHD, Varley (2011) notes that the first step in working with adolescents is to empower them by talking with them, which is in line with the findings of the current study in suggesting that adolescents with ADHD do have to things to say about their ADHD, in particular in the context of a semi-structured interview conducted well into the process of having establishing rapport with a clinician. Fostering patient awareness and an understanding of symptoms (Turguay et al., 2012) is especially critical during adolescence, given the upcoming transition to adult services that will occur for many individuals who continue to experience symptoms and impairment into adulthood.

Stigma and adolescent-specific barriers to reporting. Stigma and misconceptions regarding mental health are not only present in adult populations but is an area of emerging interest and may be a barrier to reporting for adolescents. Clinicians

should carefully consider the importance of building rapport with the adolescent as well as psychoeducation regarding ADHD, given emerging research documenting the existence of stigma around reporting ADHD symptoms (Bussing et al., 2011; Gajaria et al., 2011; Rucklidge & Tannock, 2000). One study by Bussing, et al. (2011) found that adolescents with ADHD self-reported psychopathology in the normative range, which agreed poorly with parent reports; however, adolescents endorsed high rates of impairment in agreement with what parents indicated. These authors also found that adolescents' perceptions of ADHD stigma negatively predicted treatment engagement and authors concluded discrepancies in adolescent reports of impairment versus symptom endorsement was reflective of the concerns adolescents endorsed regarding the stigma of reporting ADHD symptoms. Perceptions of stigma may be particularly influential in adolescent report and treatment pursuit for adolescents, given the importance of peer approval during this developmental period. Developmentally sensitive psychoeducation (Bussing et al., 2011; Varley, 2011) has been reported as an important step in facilitating medication treatment attitudes and stigma within the area of ADHD, which may represent strong barriers to service usage (Bussing et al., 2011). This step is a critical one in order to begin to facilitate and foster adolescents' sense of agency and ownership for their own mental health care, which is consistent with the developmental perspective highlighted in this study.

It is also important to consider how context and goals and hence differences in motivations or barriers may factor into differences in parent versus adolescent disclosure. Parents may be approaching an assessment situation extremely motivated to share their

concerns and receive support and answers, whereas at the beginning of an interview or meeting with a clinician, adolescents may feel a number of barriers that would impact disclosure. For instance, brief meetings which limit the establishment of rapport, misinformation or misbeliefs about the role of the psychologist/clinician (e.g., "Am I here because I'm crazy?"), or maybe not knowing why they are there at all depending on what parents have discussed can represent major barriers to accurate symptom reporting.

Autonomy and developmental considerations in assessment. Developmentally appropriate assessment methods are also critical. For instance, in our clinical experience we have noted that adolescents readily respond to more demonstrative scenario-like questions rather than a standard assessment of the existence of symptoms. For instance, asking the adolescent, "Are you the type of teen when your mom asks you to pick up your laundry, take it upstairs to your room and put it away, then come back down with your backpack and start your homework, but she finds you ten minutes later, laundry at your side in the basement playing Xbox? OR are you more like the teen who got the laundry, didn't put it away, but shoved it in the doorway of your room and made it back downstairs with your backpack?" allows the use of engaging scenarios to demonstrate symptoms typical of ADHD, which is often part of practice during a semi-structured interview. Innovative, technologically based methods have also been proposed as a way to obtain reports and should be an area of future consideration (e.g., the use of a personal digital assistant; Denisco, as cited in Nahlik, 2004) or perhaps more visually based methods such as video clip scenarios of characters demonstrating "real-life" symptoms of ADHD contrasted with different presentations where adolescents report which is most

"like me" may be more evocative in adolescents with ADHD. For instance, the Dominic Interactive for Adolescents is a self-administered, computerized presentation of pictures and questions examining the presence of symptoms of the most frequent disorders occurring adolescents aged 12 to 15 (Bergeron et al., 2010).

There is limited work examining adolescents' actual perspectives in their mental health process with respect to ADHD. Not surprisingly, a qualitative study by Brinkman et al. (2012) examining the perspectives of adolescents with ADHD clearly identified themes of adolescent reported lack of involvement in discussions and the decision-making process regarding their ADHD treatment. In particular, the Brinkman et al. study highlighted adolescents as "silent bystanders at the time of diagnosis" (e.g., "I don't usually talk during doctor visits. I don't think my doctor really cares at all about what I'm saying. He makes decisions anyway" (p. 58). Starting on a trajectory of lack of involvement has implications for adolescents' agency in later care as well as in important issues such as medication adherence, especially given children diagnosed with ADHD take increasingly amounts of independence in their care as they mature (Bussing et al., 2011). It has been suggested that whether adolescents feel their voice is heard by parents and doctors is also a factor in medication adherence (Brinkman et al. 2012).

Methodology of assessment. Method of assessment in obtaining the adolescent's self-report is another important consideration. Individuals with ADHD have been noted to rush through rating scales and respond carelessly as a reason to explain lower self-report (Sibley et al., 2010), therefore face-to-face interviewing may be a more effective method for obtaining self-report in adolescents with ADHD (Hartung et al.,

2005). This finding would be supported by the current study where the adolescent reported ADHD scale of the SDQ was significantly lower than the parent and teacher scales, while adolescent and teacher reports did not differ on interview. Given the accumulation of evidence supporting the ability of adolescents with ADHD to report on their symptoms, the previous analyses raise questions regarding the ideal method of report. In addition, at the beginning of the K-SADS-PL semi-structured interview, participants were broadly asked about their concerns. Responses were documented and the number of their distinct concerns was summed. The data available overwhelmingly suggested that parents reported more concerns than did adolescents when asked in this open-ended manner. In fact adolescents reported few, if any, concerns when asked in this way. However, despite reporting few or no concerns initially, when asked about specific symptoms, adolescents endorsed symptoms (in the area ADHD or other relevant symptoms as well) when queried on the K-SADS-PL. More specifically, parents reported significantly more concerns than adolescents, $t(103) = 13.82, p < .001$, where parents reported a mean of 6.04 (SD = 2.86, range = 16) concerns and adolescents reported a mean of 2.09 (SD = 1.65, range = 7) concerns when asked at the beginning of the semi-structured interview in an open-ended format. In fact, 22 adolescents (18% of the sample for which this data was available) reported they had no concerns at all; however, these adolescents who stated they did not have any concerns at the beginning of the K-SADS-PL interview reported a mean of 5.41 (SD = 4.39) ADHD symptoms to be present all of the time. Thus, it would seem that the method of questioning, as well as the time spent of the establishment of rapport are important factors in obtaining symptom reports in these

adolescents. When adolescents did report a limited number of concerns they were most often regarding themes of school difficulties or concerns about the future (i.e., future success, what to do in life, whether or not they will succeed in life or make enough money), or adolescents would comment on differences they have noticed on and off of medication.

Considering the large difference in number of concerns reported during the open-ended portion of the K-SADS-PL and later endorsement of a significant number of ADHD symptoms during interview, these findings seem to suggest that specific and direct questions may be optimal for adolescents with ADHD to report on their symptoms, as opposed to more general, open-ended questions. This finding may be particularly relevant in situations where an adolescent may be consulted briefly or be asked to complete a brief questionnaire rather than being a valued informant in a clinical assessment (for instance, in some medical practices where the physician may focus on parent concerns and reports then briefly ask the adolescent how things are going). Thus, there is some evidence above to suggest interview reports may somewhat more ideal for adolescents with ADHD to report on their symptoms if there is a choice between interview or questionnaire report only. This suggestion is in line with Hartung et al.'s (2005) work that examined adolescent and parent interview and questionnaire reports of behaviour and concluded that semi-structured interviews are the best method to assess disruptive behaviour disorders. Indeed, it has been suggested that pediatricians should help model shared decision making for families and in order to support the increasing

autonomy of adolescents in their health care (Bussing et al., 2011) as well as facilitate the transition to adult services that is imminent.

The current study demonstrated that when asked briefly about concerns in a general way, adolescents with ADHD may report limited concerns, but these same adolescents can proceed to extensively report symptoms during a semi-structured, thorough clinical interview following the establishment of rapport. Thus, the current study has implications in understanding the best way to assess adolescents with ADHD, with respect to how to obtain information and interview them in a developmentally appropriate way. Given findings in the current study that adolescents with ADHD are reporting on their ADHD symptoms; yet, in some cases not to the same degree as other informants, and that their reports increase when sub threshold symptoms are taken into account; this would be in line with the five symptom threshold proposed for use with older adolescents/adults in DSM-5 (Tannock, 2012). That is, considering that adolescents with ADHD are endorsing symptoms but not to the magnitude other informants report, clinicians need to carefully consider the impact of symptoms adolescents do report. Also, parent adolescent reports were particularly discrepant with respect to symptoms of inattention specifically, thus clinicians should also be especially mindful of these findings with respect to self-report of this area, while still working within the broader criteria for diagnosis.

Implications for future outcomes and treatment engagement are also considered. Taking a developmental perspective, issues of autonomy, agency, and increasing independence are critical ongoing tasks during this period. Involvement in the

assessment and treatment process is incredibly important for this developmental stage as well as in fostering an adolescent's ownership for mental health care both for future independence (e.g., transition to independence in moving away from home) and agency in treatment (e.g., medication adherence and minimization of risks associated with medication misuse or agency in pursuing other interventions). As individuals with ADHD age and develop increasing independence in their treatment roles, studies have demonstrated that less than half of adolescents continue to take medication (Visser, Lesesne, & Perou, 2007). Increasing independence and the influence of peers have been noted to be factors in medication discontinuation (Meaux, Hester, Smith, & Shoptaw, 2006). As such, it has been suggested that psychotherapy may be a helpful consideration during this time, in light of the context and changes during this transition phase (Turguay et al., 2012). A qualitative study of the views of adolescents with ADHD on their evolving role in their medication management indicated that adolescents described their involvement in their treatment planning as inadequate (Brinkman et al., 2012). The authors of this study suggested medication nonadherence on behalf of the adolescents may be conceptualized as an act of rebellion on the part of adolescents who feel unheard or not respected by parents and doctors in decision making. For instance, if the literature asserts that self-report is not diagnostic and our clinical practice reflects this, the resultant message to the adolescent is that their views are not important. Thus, it is critical that adolescents feel that their input is valuable and that they are important members of their health care team. For adolescents who self-report few symptoms or minimal impairment, directly discussing informant report differences may be useful in treatment, such that

helping adolescents recognize any discrepancies between their reports and other reports, akin to methods used in motivational interviewing. This may assist adolescents in gaining increased insight into their symptoms, moving them into a "precontemplative" stage and hence ready for treatment or improve treatment adherence (Charach, Volpe, Boydell, & Gearing, 2008). Similarly others have suggested the use of informant discrepancies to promote therapeutic alliance and intervention design (Achenbach, 2011). Understanding informant viewpoints is also a useful tool in better understanding how to intervene (De Los Reyes et al., 2011). For instance, there may be important implications for rapport and treatment adherence if a clinician begins treatment by targeting areas individuals agree are problematic before addressing symptoms that are not reported by the individual themselves. Furthermore, collecting adolescent self-report also offers a baseline with which to monitor change in treatment.

Finally, these findings support previous suggestions (Nahlik, 2004; Sibley et al., 2012) for the further development of adolescent specific ADHD diagnostic guidelines. In particular, our results support the ability of adolescents to self-report and for self-report data to be considered in diagnosis. Replication of these findings in future work is needed to clarify the best methods and practices of collection (e.g., questionnaires versus interview, impact of stigma regarding ADHD, approach and establishment of rapport with clinician); however, findings strongly suggest the ability of adolescents with ADHD to report on both impairment and symptoms.

Limitations and Future Directions

There were some limitations to the current study. A greater number of female participants would have allowed for more power in analyses targeting gender differences; however, the current sample was representative of ADHD population in terms of the gender breakdown (APA, 2000). The decreased number of available teacher interviews was not ideal; however, this information was valuable and offered the ability to compare ADHD interview reports across three informants, a comparison that has not been done elsewhere to our knowledge. The SDQ was somewhat limited with respect to the breadth of ADHD symptoms addressed and the impairment portion of this measure inquired about impairment across a number of areas, not solely regarding impairment specific to ADHD. In addition, participants in the current sample were recruited through pediatricians' offices and the majority of parents reported having engaged in post-secondary education, suggesting the sample is of an upper socio-economic status, given education levels and access to specialized services. Thus, these findings may not be generalizable to all individuals with ADHD.

Future studies should attempt to go beyond just examining informant reports and should attempt to include converging objective measures of the impact of ADHD symptoms. Including objective validators that have been demonstrated to be closely associated with ADHD symptoms would be ideal. For instance, well-established correlates of ADHD such as school dropout rates, measuring homework completion, or substance use (Barkley, 2006) would be useful to include in future studies of informant report. The current study did attempt to find ways to differentiate adolescents who self-reported symptoms and those who did not on concrete measures, such as age, gender, and

impairment, with some findings emerging in the area of impairment. Future studies should also consider other variables that may differentiate high versus low self-reporters. For instance, one area of examination could be referral status. In the current study it was noted anecdotally that a small number of participants were referrals requested on behalf of the adolescents themselves. In addition, this would also be useful from a treatment perspective. That is, high self-reporters may be more ready for psychological treatments, whereas low reporters may need help with treatment readiness.

Future studies should also systematically document issues that adolescents report are concerning them and examine this variable in adolescents who report symptoms and those who do not. The type of disorder is another important influential factor when it comes to the amount of reliance placed upon self-report. Anxiety and depression are often classified as internalizing disorders and symptoms may not be observable, thus self-report is relied upon more heavily. In contrast, ADHD is considered an externalizing disorder (DSM-IV-TR, APA, 2000) and behaviour manifestations may be more easily observed by parents and teachers, in particular, hyperactive and impulsive symptoms. Although inattentive symptoms are part of ADHD, an externalizing disorder, this classification may not be so clear, as some suggest that inattention problems be conceptualized as internalizing behaviours (Kooij et al., 2008). Thus, reporting on inattentive symptoms may be especially challenging for other informants such as parents or teachers. Finally, longitudinal studies exploring self-report are warranted. ADHD is a condition first diagnosed in childhood and all conditions in this grouping would rely heavily on other informant reports, while assessment of adult samples includes self-

report. Longitudinal study of self-report across the lifespan would allow for examination into how self-report changes over time and with age. This might importantly inform us about individual differences in changes in reports that could impact treatment.

Conclusions

Findings contribute to an emerging literature on the diagnostic value of self-reported ADHD symptoms in adolescents with ADHD (Klimkeit et al., 2006; Varley, 2011). The current study suggests that while adolescents with ADHD may report fewer symptoms relative to parents, their level of report is clinically significant and is in many cases on par with teacher reports. Overall, parents viewed their adolescents as more impaired relative to teacher and adolescent reports, while teacher and adolescent reports of impairment were similar. Adolescents with ADHD also demonstrated high internal consistency and inter-method validity in their reporting of ADHD symptoms, comparable to parents and teachers. These findings are in line with other work demonstrating the utility of self-reports in adolescents with ADHD (Brinkman et al., 2011; Connors et al., 2012; Hope et al., 1999; Varley, 2011). Adolescent involvement in clinical practice is a critical step in building agency, reducing stigma, treatment continuation, and fostering better outcomes in their own mental health care (Brinkman et al., 2011; Bussing et al., 2011; Gajaria et al., 2011). It will be important to continue to develop practice guidelines for the use of adolescent self-report of ADHD symptoms in order to foster positive and healthy development for these youth.

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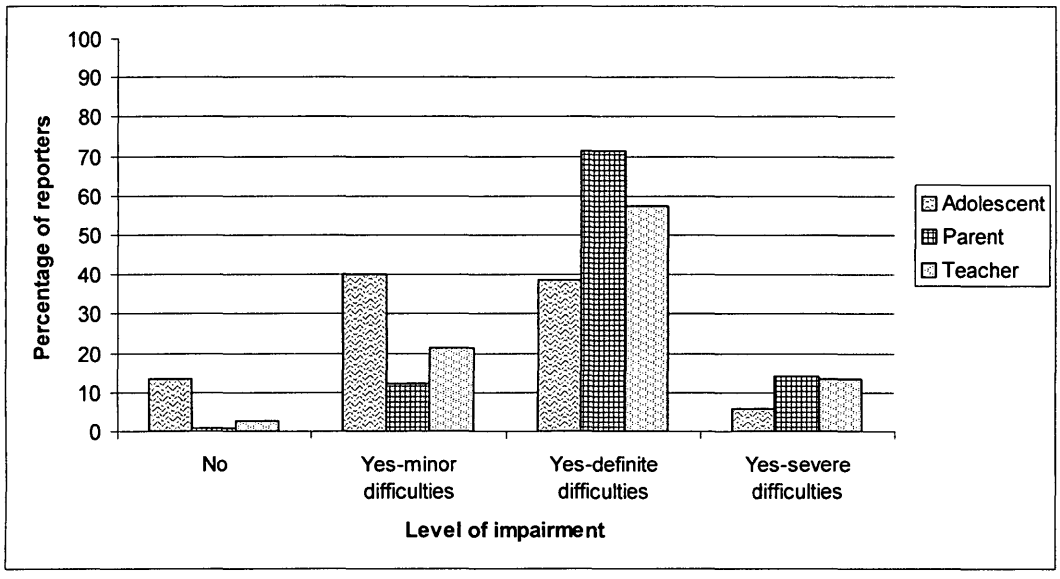
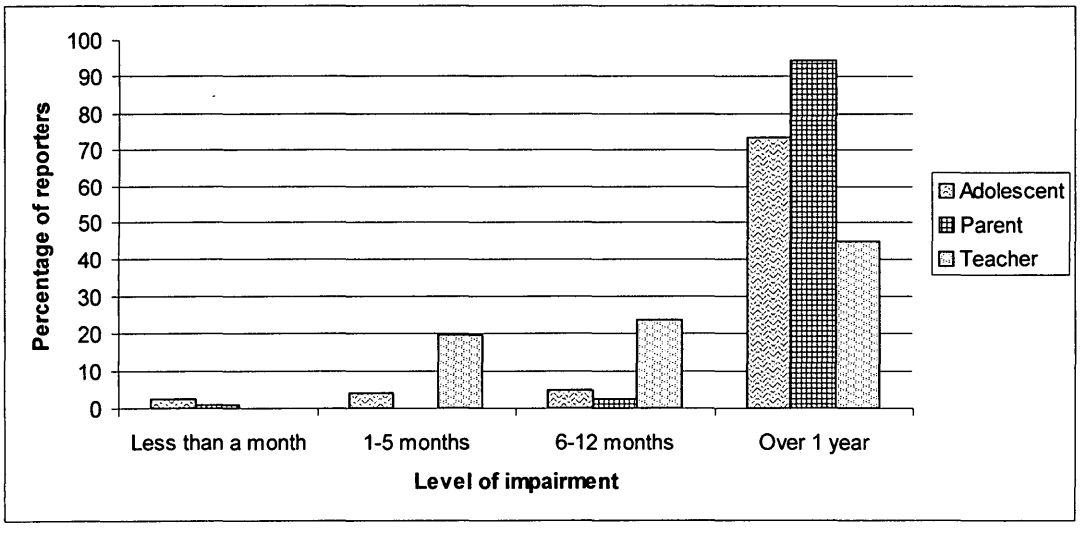
Appendix A: Percent of sample of informant (parent, adolescent, teacher) by level of endorsement of impairment for each impairment item

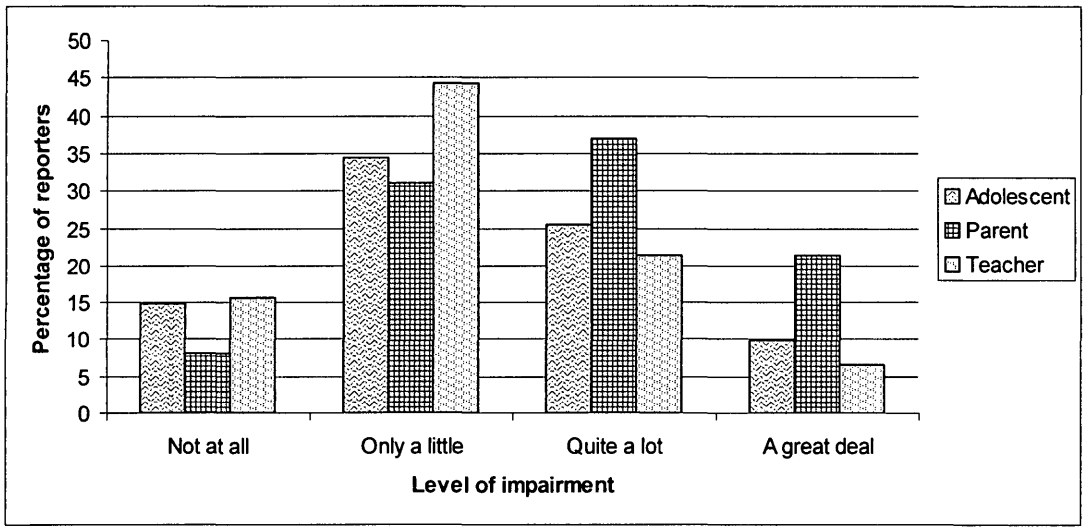
Impairment item 1: Overall, do you think that your child/you/this student has difficulties in one or more of the following areas: emotions, concentration, behaviour or being able to get on with other people?



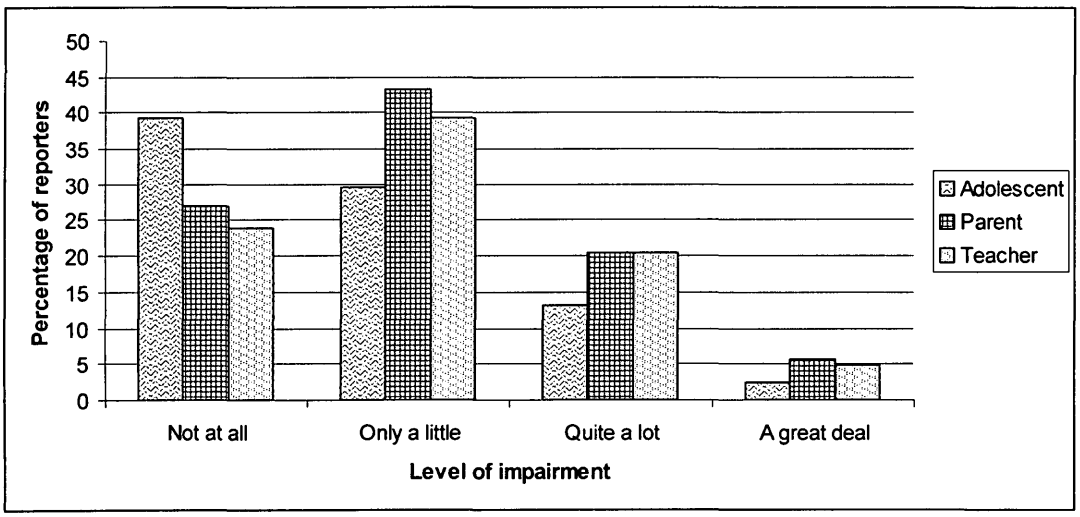
Impairment item 2: How long have these difficulties been present?



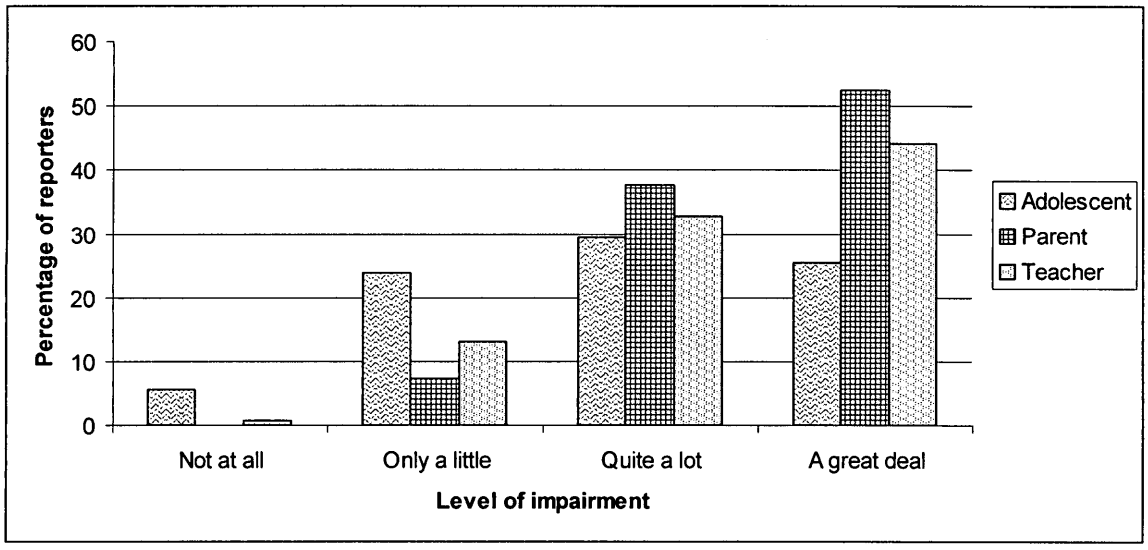
Impairment item 3: Do the difficulties upset or distress your child/you/this student?



Impairment item 4: Do the difficulties interfere with your child's/your/this student's everyday life with friends?



Impairment item 5: Do the difficulties interfere with your child's/your/this student's everyday life in classroom learning?



Impairment item 6: Do the difficulties put a burden on the family/the class/make it harder for those around you?